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NATIONAL PARK SERVICE
STEPHEN T. MATHER, DIRECTOR

WILD ANIMALS

of

GLACIER NATIONAL PARK

THE MAMMALS

With Notes on Physiography and Life Zones

By
VERNON BAILEY
Chief Field Naturalist, Bureau of Biological Survey, Department of Agriculture

THE BIRDS

By
FLORENCE MERRIAM BAILEY
Author of Handbook of Birds of the Western United States

WASHINGTON
GOVERNMENT PRINTING OFFICE
1918

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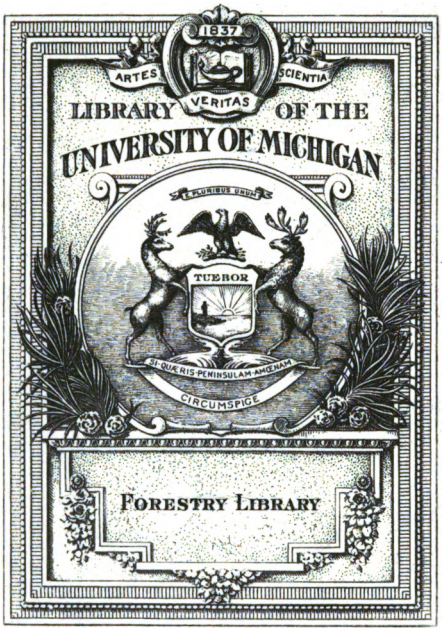

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FRANKLIN K. LANE, SECRETARY
NATIONAL PARK SERVICE
STEPHEN T. MATHER, DIRECTOR

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CONTENTS.

	Page.
General features governing life in Glacier National Park	15
I. Physiography	15
II. Life zones	18
Transition Zone	19
Canadian Zone	20
Hudsonian Zone	22
Arctic-Alpine Zone	23
THE MAMMALS.	
Order Ungulata: Hoofed animals—cattle, sheep, goats, antelope, and deer	25
Family Bovidæ: Cattle, sheep, and goats	25
Bison, or buffalo	25
Mountain sheep, or bighorn	26
Mountain goat	28
Family Antilocapridæ: Prong-horned antelope	31
Prong-horned antelope	31
Family Cervidæ: Moose, elk, and deer	31
American moose	31
American elk, or wapiti	32
Mule deer	33
Western white-tail deer	35
Order Rodentia: Gnawing animals	37
Family Sciuridæ: Squirrels, chipmunks, woodchucks, etc	37
Richardson pine squirrel	37
Flying squirrel	39
Yellow-bellied chipmunk	40
Forest chipmunk	42
Little mountain chipmunk	42
Mantled ground squirrel	43
Columbia ground squirrel	45
Richardson ground squirrel	49
Striped ground squirrel	50
Glacier hoary marmot	50
Brown woodchuck	53
Family Muridæ: Mice, rats, etc	53
Gray bushy-tailed woodrat	53
Forest white-footed mouse	58
Mountain lemming mouse	59
Red-backed mouse	60
Large-footed meadow mouse	61
Rocky Mountain meadow mouse	62
Drummond meadow mouse	63
Rocky Mountain muskrat	63

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Order Rodentia: Gnawing animals—Continued. Page.
Family Castoridæ: Beavers 64
Beaver 64
Family Erethizontidæ: Porcupines 66
Yellow-haired porcupine 66
Family Zapodidæ: Jumping mice 69
Rocky Mountain jumping mouse 69
Family Geomyidæ: Pocket gophers 71
Saskatchewan pocket gopher 71
Brown pocket gopher 73
Order Lagomorpha: Rabbitlike animals 75
Family Ochotonidæ: Conies 75
Cony 75
Family Leporidæ: Rabbits and hares 77
Snowshoe rabbit 77
Prairie jack rabbit 78
Order Carnivora: Flesh eaters 79
Family Felidæ: Cats 79
Mountain lion 79
Canada lynx 81
Bobcat 82
Family Canidæ: Wolves and foxes 82
Gray wolf 82
Northern coyote 83
Mountain red fox 84
Kit fox, or swift 85
Family Mustelidæ: Otters, martens, minks, weasels, etc 85
Otter 85
Mink 86
Arizona weasel 87
Long-tailed weasel 87
Bonaparte weasel 88
Marten 88
Fisher 90
Wolverine 90
Northern skunk 91
Badger 91
Family Ursidæ: Bears 92
Black or cinnamon bear 92
Grizzly bear, or silvertip 96
Order Insectivora: Insect eaters 97
Family Soricidæ: Shrews 97
Water shrew 97
Dusky shrew 98
Dobson shrew 99
Masked shrew 100
Order Chiroptera: Winged mammals 100
Family Vespertilionidæ: Bats 100
Long-legged bat 100
Brown bat 101
Silver-haired bat 101
Hoary bat 101

Digitized by Google

THE BIRDS.

Page.
Introductory 103
I. Itinerary and acknowledgments 103
II. Where the summer birds may be found 104
Birds of the lower levels 104
Birds of the middle regions 105
Birds of the higher regions 106
III. Permanent residents and transient visitants 107
IV. Key to the commoner summer birds 107
Order Pygopodes: Diving birds 110
Family Colymbidæ: Grebes 110
Western grebe 110
Holbœll grebe 111
Horned grebe 112
Eared grebe 112
Family Gaviidæ: Loons 113
Loon 113
Order Longipennes: Long-winged swimmers 114
Family Laridæ: Gulls and terns 114
California gull 114
Ring-billed gull 114
Bonaparte gull 114
Forster tern 114
Order Steganopodes: Totipalmate swimmers 115
Family Phalacrocoracidæ: Cormorants 115
Double-crested cormorant 115
Family Pelecanidæ: Pelicans 115
White pelican 115
Order Anseres: Lamellirostral swimmers 115
Family Anatidæ: Ducks, geese, and swans 115
Merganser 115
Red-breasted merganser 116
Hooded merganser 116
Mallard 117
Gadwall 118
Baldpate 118
Green-winged teal 118
Blue-winged teal 119
Cinnamon teal 119
Shoveller 119
Pintail 120
Wood duck 120
Redhead 121
Canvas-back 121
Scaup duck 121
Lesser scaup duck 121
Ring-necked duck 122
Barrow golden-eye 122
Buffle-head 124
Harlequin duck 124
White-winged scoter 127
Ruddy duck 127
Snow goose 127

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Order Anseres: Lamellirostral swimmers—Continued.
Family Anatidæ: Ducks, geese, and swans—Continued. Page.
Ross goose ... 127
Canada goose ... 127
Whistling swan ... 129
Trumpeter swan ... 129
Order Herodiones: Herons, bitterns, etc ... 129
Family Ardeidæ: Herons, bitterns, etc ... 129
Bittern ... 129
Great blue heron ... 131
Order Paludicolæ: Cranes, rails, etc ... 131
Family Gruidæ: Cranes ... 131
Sandhill crane ... 131
Family Rallidæ: Rails, coots, etc ... 131
Sora rail ... 131
Coot ... 132
Order Limicolæ: Shorebirds ... 132
Family Phalaropodidæ: Phalaropes ... 132
Northern phalarope ... 132
Family Recurvirostridæ: Avocets, etc ... 132
Avocet ... 132
Family Scolopacidæ: Snipe, sandpipers, etc ... 132
Wilson snipe ... 132
Pectoral sandpiper ... 133
Greater yellow-legs ... 133
Western solitary sandpiper ... 133
Upland plover ... 133
Spotted sandpiper ... 133
Canadian curlew ... 134
Family Charadriidæ: Plovers ... 134
Black-bellied plover ... 134
Killdeer ... 134
Order Gallinæ: Gallinaceous birds ... 135
Family Odontophoridæ: Bob-whites, etc ... 135
Bob-white ... 135
Family Tetraonidæ: Grouse, ptarmigan, etc ... 135
Richardson grouse ... 135
Franklin grouse ... 136
Gray ruffed grouse ... 137
Southern white-tailed ptarmigan ... 139
Columbian sharp-tailed grouse ... 145
Order Columbæ: Pigeons ... 145
Family Columbidæ: Pigeons ... 145
Western mourning dove ... 145
Order Raptores: Birds of prey ... 145
Family Cathartidæ: Vultures ... 145
Turkey vulture ... 145
Family Buteonidæ: Hawks, eagles, etc ... 146
Marsh hawk ... 146
Sharp-shinned hawk ... 146
Cooper hawk ... 146
Western goshawk ... 147
Western red-tail ... 147
Swainson hawk ... 147
Squirrel hawk ... 147

Digitized by Google

Order Raptores: Birds of prey—Continued.
Family Buteonidæ: Hawks, eagles, etc.—Continued. Page.
Golden eagle 148
Bald eagle 149
Family Falconidæ: Falcons, etc. 149
Prairie falcon 149
Duck hawk 149
Pigeon hawk 149
Desert sparrow hawk 149
Family Pandionidæ: Ospreys 150
Osprey 150
Family Bubonidæ: Horned owls, etc 154
Short-eared owl 154
Great gray owl 154
Richardson owl 154
Saw-whet owl 155
MacFarlane screech owl 156
Western horned owl 156
Arctic horned owl 156
Snowy owl 156
Hawk owl 156
Rocky Mountain pygmy owl 157
Order Coccyges: Cuckoos, kingfishers, etc 157
Family Alcedinidæ: Kingfishers 157
Belted kingfisher 157
Order Pici: Woodpeckers, etc 158
Family Picidæ: Woodpeckers 158
Rocky Mountain hairy woodpecker 158
Batchelder woodpecker 158
Arctic three-toed woodpecker 158
Alaska three-toed woodpecker 158
Red-naped sapsucker 159
Williamson sapsucker 159
Northern pileated woodpecker 159
Red-headed woodpecker 160
Lewis woodpecker 161
Red-shafted flicker 161
Order Macrochires: Nighthawks, swifts, and hummingbirds 161
Family Chordeilidæ: Nighthawks 161
Pacific nighthawk 161
Family Micropodidæ: Swifts 162
Vaux swift 162
White-throated swift 162
Family Trochilidæ: Hummingbirds 162
Black-chinned hummingbird 162
Broad-tailed hummingbird 163
Rufous hummingbird 163
Calliope hummingbird 163
Order Passeres: Perching birds 164
Family Tyrannidæ: Tyrant flycatchers 164
Kingbird 164
Olive-sided flycatcher 164
Western wood pewee 164
Western flycatcher 164

Digitized by Google

Order Passeres: Perching birds—Continued.
Family Tyrannidæ: Tyrant flycatchers—Continued. Page.
Traill flycatcher ... 164
Hammond flycatcher ... 165
Family Alaudidæ: Larks ... 165
Desert horned lark ... 165
Family Corvidæ: Crows, jays, magpies, etc ... 165
Magpie ... 165
Black-headed jay ... 165
Rocky Mountain jay ... 166
Raven ... 167
Western crow ... 167
Clark nutcracker ... 167
Family Icteridæ: Blackbirds, etc ... 169
Sagebrush cowbird ... 169
Thick-billed redwing ... 169
Western meadowlark ... 170
Brewer blackbird ... 170
Family Fringillidæ: Finches, sparrows, etc ... 171
Western evening grosbeak ... 171
Rocky Mountain pine grosbeak ... 171
Cassin purple finch ... 172
Crossbill ... 173
White-winged crossbill ... 173
Gray-crowned leucosticte ... 173
Redpoll ... 174
Pine siskin ... 174
Snow bunting ... 175
Alaska longspur ... 175
Chestnut-collared longspur ... 175
McCown longspur ... 176
Western vesper sparrow ... 176
Western Savannah sparrow ... 176
Western lark sparrow ... 176
White-crowned sparrow ... 177
Gambel sparrow ... 177
Western tree sparrow ... 177
Western chipping sparrow ... 177
Montana junco ... 177
Mountain song sparrow ... 178
Lincoln sparrow ... 178
Slate-colored fox sparrow ... 178
Arctic towhee ... 179
Black-headed grosbeak ... 179
Lazuli bunting ... 180
Family Tangaridæ: Tanagers ... 180
Western tanager ... 180
Family Hirundinidæ: Swallows ... 180
Cliff swallow ... 180
Barn swallow ... 180
Tree swallow ... 180
Northern violet-green swallow ... 181
Bank swallow ... 181

Digitized by Google

Order Passeres: Perching birds—Continued. Page.
Family Bombycillidæ: Waxwings 182
Bohemian waxwing 182
Cedar waxwing 182
Family Laniidæ: Shrikes 183
White-rumped shrike 183
Family Vireonidæ: Vireos 183
Western warbling vireo 183
Family Mniotiltidæ: Wood warblers 183
Black and white warbler 183
Orange-crowned warbler 183
Yellow warbler 183
Audubon warbler 183
Townsend warbler 184
Grinnell water-thrush 184
Macgillivray warbler 186
Western yellow-throat 186
Pileolated warbler 186
Redstart 187
Family Motacillidæ: Wagtails 187
Pipit 187
Family Cinclidæ: Dippers 188
Water ouzel 188
Family Mimidæ: Mockingbirds, catbirds, etc 190
Catbird 190
Family Troglodytidæ: Wrens 191
Rock wren 191
Western house wren 191
Western winter wren 191
Family Certhiidæ: Creepers 192
Rocky Mountain creeper 192
Family Sittidæ: Nuthatches 192
Rocky Mountain nuthatch 192
Red-breasted nuthatch 193
Family Paridæ: Titmice 193
Long-tailed chickadee 193
Mountain chickadee 193
Chestnut-backed chickadee 194
Family Sylviidæ: Kinglets, etc 194
Western golden-crowned kinglet 194
Ruby-crowned kinglet 194
Family Turdidæ: Thrushes, solitaires, bluebirds, etc 195
Townsend solitaire 195
Willow thrush 195
Olive-backed thrush 196
Audubon hermit thrush 196
Western robin 196
Northern varied thrush 197
Mountain bluebird 198

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ILLUSTRATIONS.

PLATES.

THE MAMMALS.

		Page.
PLATE I.	Life zone section of slope in Glacier Park	24
II.	Buffalo bull on Flathead Bison Range near Dixon, Mont	25
III.	Fig. 1.—A band of old rams in Yellowstone Park. Fig. 2.—Mountain sheep just below timberline in Glacier Park	28
IV.	Fig. 1.—A bunch of mountain goats in Alpine meadow. Fig. 2.—Mountain goat in Bronx Park	29
V.	Fig. 1.—A family of goats on their way down the mountain side. Fig. 2.—The same family of goats feeding in an Alpine meadow	30
VI.	Fig. 1.—Mule deer buck in short summer red coat. Fig. 2.—Mule deer in winter	34
VII.	Fig. 1.—White-tail deer in summer red coats. Fig. 2.—White-tail doe in long gray winter coat	35
VIII.	Fig. 1.—Mantled ground squirrel in upright position. Fig. 2.—Mantled ground squirrels feeding on scattered oats	44
IX.	Fig. 1.—Burrow of Columbia ground squirrel. Fig. 2.—Columbia ground squirrel and burrow	45
X.	Fig. 1.—Richardson ground squirrel. Fig. 2.—Pale thirteen-lined ground squirrel	50
XI.	Fig. 1.—Hoary marmot at Lake Ellen Wilson. Fig. 2.—Hoary marmot in Gunsight Pass	52
XII.	Fig. 1.—Bushy-tailed woodrat at entrance of cave. Fig. 2.—Bushy-tailed woodrat and building material	53
XIII.	Fig. 1.—Beaver house on bank of Belly River. Fig. 2.—Beaver in National Zoological Park	64
XIV.	Fig. 1.—Porcupine retreating down trail. Fig. 2.—Porcupine coming up trail	68
XV.	Fig. 1.—Mountain lions in top of yellow-pine tree. Fig. 2.—The same lions in another position	80
XVI.	Fig. 1.—Canada lynx. Fig. 2.—Bobcat	81
XVII.	Fig. 1.—Coyote in National Zoological Park. Fig. 2.—Wolves in National Zoological Park	82
XVIII.	Fig. 1.—Fisher in captivity. Fig. 2.—Otters in captivity	86
XIX.	Black bears at garbage pile	94
XX.	Fig. 1.—Ground where bears have dug up bulbs. Fig. 2.—Burrow of ground squirrel dug out by bear	95
XXI.	Grizzly bears in Yellowstone Park	96

THE BIRDS.

XXII.	Eared grebe	112
XXIII.	Loons	113
XXIV.	Mallards	118
XXV.	Shovellers	119
XXVI.	Sora rails	130
XXVII.	Ruffed grouse	136
XXVIII.	Marsh hawks	146

Digitized by Google

Page.

PLATE XXIX. Young ferruginous rough-leg 148
XXX. Young golden eagle 149
XXXI. Belted kingfishers 156
XXXII. Williamson sapsuckers 158
XXXIII. Black-billed magpies 164
XXXIV. Water ouzel's nest 188
XXXV. Catbirds 190
XXXVI. Northern varied thrush 197
XXXVII. Map of life zone ..... In pocket.

TEXT FIGURES.

THE MAMMALS.

FIG. 1. Transition Zone on Big Prairie in North Fork Valley 20
2. Head of 5-year-old ram from Chief Mountain 28
3. A five-point bull elk in early winter 33
4. Head of mule deer buck from Huckleberry Mountain 34
5. Head of white-tail deer at Belton, Mont 35
6. (I) Yellow-bellied chipmunk; (II) pale 13-lined ground squirrel; (III) mantled ground squirrel; all from museum skins 40
7. Plan of underground den of Columbia ground squirrel 48
8. Woodrat in his nest of moss and lichens in old cabin 56
9. Woodrat nest on shelf in corner of cabin 57
10. Cottonwood stump cut by beavers on Camas Creek 66
11. Jumping mouse 70
12. Pocket gopher of the genus *Thomomys* 71
13. Northern white-tailed jack rabbit in March 78
14. Two mountain lions that will kill no more game 80
15. Mountain red fox in Wind River Mountains, Wyoming 84
16. Mink photographed at old cabin above Kintla Lake 86
17. (I) Dusky shrew; (II) masked shrew; photographed from alcoholic specimens 99
18. (I) Brown bat; (II) long-legged bat; museum specimens 100

THE BIRDS.

19. Western grebe 111
20. Horned grebe 112
21. Red-breasted merganser 117
22. Hooded merganser 116
23. Baldpate 118
24. Green-winged teal 119
25. Blue-winged teal 120
26. Cinnamon teal 120
27. Pintail 120
28. Canvas-back 121
29. Scaup duck 121
30. Golden-eyes on Yellowstone Lake 122
31. Buffle-head 124
32. Western harlequin duck 124
33. Harlequin duck at Iceberg Lake 126
34. White-winged scoter 127
35. Ruddy duck 127
36. Canada geese 128
37. Bittern 130
38. Young great blue heron 130
39. Avocet 132
40. Wilson snipe 133
41. Killdeer 134

Digitized by Google

Page.
FIG. 42. Franklin grouse 136
43. Female ptarmigan in summer 138
44. Mother ptarmigan and chicks 139
45. Ptarmigan in winter 143
46. Sharp-tailed grouse 144
47. Sharp-shinned hawk 146
48. Goshawk 146
49. Red-tailed hawk 147
50. Swainson hawk 147
51. Bald eagle 149
52. Duck hawk 149
53. Pigeon hawk 149
54. Sparrow hawk 150
55. Nest of osprey 151
56. Two photographs of osprey and nest 152
57. Short-eared owl 154
58. Saw-whet owl 154
59. Screech owl 155
60. Horned owl 156
61. Arctic three-toed woodpecker 158
62. Northern pileated woodpecker 159
63. A family of red-shafted flickers 160
64. Nighthawk 162
65. Rufous hummingbird 163
66. Calliope hummingbird 163
67. Kingbird 164
68. Horned lark 165
69. Rocky Mountain jay 166
70. Clark nutcracker 168
71. Red-winged blackbird 169
72. Meadowlark 170
73. Brewer blackbird 170
74. Evening grosbeak 171
75. Cassin purple finch 172
76. Crossbills 172
77. Gray-crowned leucosticte 173
78. White-crowned sparrow 176
79. Western chipping sparrow 177
80. Cliff swallow 180
81. Barn swallow 181
82. Tree swallow 181
83. Cedar waxwing 182
84. Audubon warbler 184
85. Townsend warbler 184
86. Macgillivray warbler 186
87. Western yellow-throat 186
88. Water ouzel at entrance to nest 188
89. Western house wren 191
90. Young Rocky Mountain nuthatches 192
91. Long-tailed chickadee 193
92. Mountain chickadee 194
93. Western robin 197
94. Mountain bluebird 199

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GENERAL FEATURES GOVERNING LIFE IN GLACIER NATIONAL PARK.

By VERNON BAILEY.

I. PHYSIOGRAPHY.

Glacier National Park lies in northwestern Montana, along the main range of the Rocky Mountains from the Canadian boundary south to the Great Northern Railway. From the rugged crest of the Continental Divide it descends on the east to the edge of the Great Plains, and on the west to the dense forests of the Flathead Valley. Its sinuous and spiny backbone forms one of the roughest ranges on the Continent; and, while its highest peaks reach an elevation but little above 10,000 feet, it has all the appearance of a more lofty range, for the timberline is low and its upper slopes and peaks reach far into the snow and glacier-laden Arctic-Alpine Zone. Its steep and jagged sides are deeply cut and furrowed by ancient glaciers, and the old glacial troughs are now filled by long, deep lakes of wonderful purity and beauty. Some of the smaller lakes are still milky from the grinding of the glaciers above them, but those farther from the ice throw back from transparent depths the deepest shades of blue and green. The long lake valleys on both sides of the range extend out between riblike lateral ridges almost as high and rugged as the dorsal crest of the range. In fact some of the highest peaks rise from these lateral ridges, while the main divide has been eaten through by the ice in notches that serve as the only available passes for present trails and future highways.

The tilted and heavily stratified shale, limestone, sandstone, and argillite, which make up a great part of the range, have given striking contrasts to the configuration of the park. Great cliffs and terraces, sharp peaks and jagged walls on one side and shelving slopes on the other, render many of what seem to be unattainable heights from some points of view quite possible of access from other points. Faint trails of mountain sheep and mountain goats may be found threading the narrow shelves and niches to the tops of many of the

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highest peaks, but some are too precipitous for even these skilled climbers. The lower slopes of the mountains are generally covered with soil, slide rock, or morainal deposits and, in each case, with such growth of vegetation as the depth of soil will support. The valleys and basins are rich and fertile, as is shown by dense forests and brilliant flower gardens.

Great melting snowbanks feed the foaming streams, while glaciers grind and sift their floury silt from muddy to milky streams and white to tinted lakes. Springs of purest water in countless numbers break out from the mountain sides and unite into rivulets and creeks and torrents as they descend the steep slopes, while the seepage of underground waters feeds velvety meadows and dense fern-clad glades. The whole region is enriched by its bounteous humidity, and the vintage of the heavy winter snows is poured out over the thirsty valleys far and wide.

Plant life is abundant and varied, and as the endless combinations of plant associations crowd and push for supremacy, those best fitted for the existing local environment hold the main areas while the less fitted are crowded back. Temperature, light, shade, moisture, depth and nature of soil, wind, and fire have all been potent factors in the present arrangement of the vegetation of the mountains, and all but the last have added beauty and interest to the flora. Fortunately the ravages of fire have not been extensive, and the grazing of domestic stock has not injured the virgin beauty of the mountain meadows, which are among the greatest attractions of the park. The flowering of one set of plants after another spreads clouds of color over the meadows and open slopes, where on one day a golden glow of dogtooth violets holds the eye, and a week later the creamy white of the west-wind flower is seen, only to be followed in rapid sequence by the delicate purple of the vetchling and the deep blue of the gentian; and so on until the short summer is over. But each dominant flower has its understudies of varied shape and color filling in every available nook and corner, while each different type of soil or varying belt of soil-moisture holds its own sets of species, from beds of purple and creamy heather above timberline down to the tall white globes of beargrass on the open slopes below. Even the deep shade of the forest is brightened by the white stars of the pine lily (*Clintonia*) and single-flowered wintergreen (*Moneses*) on carpets of false mitrewort and lacelike *Tiarella*, and by purple and white pyrolas and *Chimaphila*, scarlet painted-cups, magenta and yellow monkey flowers (*Mimulus*), together with a host of other common flowers, and occasionally some of the rare and exquisite wood orchids.

The forests vary from deep and somber stands of closely set trunks of pine, spruce, and fir, cedar, hemlock, and western tamarack, to the open and straggling timberline belts, the Christmas-tree parks of

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second-growth pines over fire-swept areas, the groves of delicate aspens scattered over the open spaces, and sturdy black cottonwoods along the streams. In each area one species holds supremacy and all others take subordinate places. The lodgepole pine is the most widespread and abundant tree, forming clear stands of slender poles or smooth trunks of sawlog size over great areas. Engelmann spruce is scattered over much of the park area and fills the Upper St. Mary and Waterton Valleys with almost pure stands of tall, straight, and graceful trunks. Balsams are generally scattered, but on some slopes are the dominant trees. Hemlock, tamarack, cedar, yellow pine, and western white pine are abundant and variously mixed in the valleys of the west slope of the park, where each in turn dominates its favorite ground, while together they form the most superb forest area of the park region. The scrubby but picturesque white-stemmed pine (*Pinus albicaulis*) of the timberline belt baffles the winds and storms more successfully than any other tree, living and thriving where beaten to the ground and held down by heavy winter snows and fierce winds until it seems little more than a coniferous carpet. Engelmann spruce, the subalpine fir, and the Lyell tamarack also struggle up to timberline in dwarfed form, and sometimes prove almost as hardy as the white-stemmed pine with which they are associated. Many other trees find a foothold and fill minor places in the forest. The Douglas spruce and limber pine, white fir, and a few junipers are found at lower levels. The graceful white birch on the west slope and the little brown western birch low down along the streams with the mountain maple and alder and many of the larger shrubs help to fill subordinate places.

The shrubs and undergrowth of the forested and open areas include many useful, ornamental, and interesting species. Flowering shrubs, as the syringa, ocean spray, mountain balm, and meadow-sweet, are conspicuous. Fruit-bearing shrubs, as chokecherry, pin cherry, thorn apple, serviceberry, elderberry, high-bush cranberry, mountain ash, red raspberry, thimbleberry, blueberries of three or more species, wild currants, and wild gooseberries, grow in greater or less profusion. The western yew and devil's club add peculiar interest and character to the shrubbery of the west slope, as do the ground cedar and silver leaf to the east slope of the park.

Even the ferns and club mosses and the real mosses and lichens in great profusion and variety add their touch to the beauty and interest of the plant life of the park as well as to the charm of the forest and the rock shelves and shady cliffs of the mountains, while the least of all the visible plant life, the pink snow, gives a rosy glow to the surface of the snow banks and glaciers.

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The bird and mammal life of the park are too rich and varied to be touched upon lightly, and each is worthy of a volume by itself. In few other places on the continent can so great a variety of the larger game animals be found close together.. The moose, elk, mule and white-tail deer, mountain goat, mountain sheep, grizzly and black bears, and the great hoary marmot are all common in parts of the park, while many of the smaller mammals furnish constant interest along the trails and about the hotels and camps.

While certain areas are at times almost devoid of bird life, there are always others where birds are abundant and where the songs of the varied thrush, the olive-backed and western hermit thrushes, the gray fox sparrow, the white-crowned sparrow, warblers, vireos, wrens, and other choice songsters may be heard. Above timberline the rosy finches and pipits breed, and mother ptarmigans lead about their broods of downy young, while lower down the Franklin, Richardson, and ruffed grouse may be studied along the trails. A number of water birds breed in the lakes, and many of the individuals are becoming unafraid of man. The opportunity for close bird study is unusually favorable, and the bird life is as full and varied as in any part of the Rocky Mountain region.

Most of the streams are well stocked, and many afford excellent trout fishing. In the larger lakes and streams the trout are large and gamey, while in the smaller streams their abundance usually compensates for their smaller size.

Reptiles and amphibians are generally scarce in the park, but two species of small garter snakes are found, and several species of frogs and toads are common.

II. LIFE ZONES.

The plants and animals of the park are distributed in a series of approximately horizontal belts or zones, but on such broken slopes that only by a broad view can the zonal arrangement be recognized. Four of the transcontinental life zones are represented, the Transition, Canadian, Hudsonian, and Arctic-Alpine, ranging from the basal slopes upward, each with its characteristic set of mammals, birds, and plants. The boundaries of these belts are not sharply defined, and each zone merges into those adjoining in a way that at times is confusing, but the conformity of certain sets of species to certain limits of altitude is apparent to the most superficial observer. That these limits are due to climatic conditions dependent largely upon altitude and slope exposure is also apparent when the evidence is considered.

The natural grouping and arrangement of the plant and animal life of the park can be best understood on the basis of the common laws of distribution. Certain species are adapted to a restricted range of

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temperature or climate, while large numbers of species have approximately the same climatic and consequently geographic range. According to well-known laws the climate normally becomes colder as the altitude and latitude become higher, but not uniformly, as slopes inclined toward the south receive and absorb more heat from the sun's rays than do level areas, and far more than the slopes inclined toward the north. Thus slope exposure greatly modifies the local climatic conditions and consequently the distribution of plant and animal life. The altitude of the base level, or country surrounding the base of the mountains, also in part determines the amount of heat available to the slopes above. A high base level holds the sun-warmed air up against the sides of the mountains and thus enables associated species to grow at higher levels than where the surrounding country is lower. Many other local influences, as air currents, prevailing winds, light and shade, humidity, and soil conditions, further modify the environment that determines the nature of the fauna and flora.

The open plains country, which barely penetrates the eastern edge of the park, supports the peculiar types of plant and animal life belonging to the Transition Zone, traces of which are found also in the lower valleys on the west slope of the park. The dense forests of lodgepole pine, spruce, and fir, which cover the base of the mountains, mark the Canadian Zone; the narrow belt of dwarfed timber at and near timberline, the Hudsonian Zone; while depauperate plants above timberline partly cover the peaks and ridges of the Arctic-Alpine Zone.

TRANSITION ZONE.

The Transition Zone, an area relatively warm and fertile and of value for the production of wheat and other cereals, lies mainly outside the park, but fortunately enough of it is included to add some of its characteristic species to the fauna and flora of the park and to provide suitable winter range for some of the important game animals of the higher and colder zones. On the east slope it is present in dilute form up to about 4,500 feet altitude on the warmest exposures, those facing toward the southwest at Glacier Station, and in the St. Mary, Swiftcurrent, and Belly River Valleys. It is indicated by tongues or patches of prairie carrying the prairie species of plants and animals, and is mainly without timber. Its shrubby vegetation consists of the little western birch, the diamond willow, serviceberry, silver-leaf, western snowberry, prairie rose, and creeping juniper, but its dominant vegetation consists of prairie grasses mixed with the loco, vetch, milk vetch, bluebonnet, brown-eyed Susan, balsam root, prairie aster, blazing star, Indian paintbrush, larkspur, puccoon, geranium, purple wind flower, and a host of other plants of the Great Plains Transition Zone area. Its characteristic mam-

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mals include the Richardson and thirteen-lined ground squirrels, the Saskatchewan pocket gopher, and the prairie hare; while the western vesper sparrow, western Savannah sparrow, western chipping sparrow, lazuli bunting, yellow warbler, and long-tailed chickadee are characteristic birds.

On the west slope of the park traces of the zone are seen in the yellow pines in the North Fork Valley, a few mountain junipers along the river banks, black thornapple along the lake shores, western birch along the streams, and an abundance of serviceberries, syringa, ocean spray, and *Ceanothus sanguineus* on the low, warm slopes; but no considerable area can be called Transition Zone. The climate of these low valleys is mild, but the snowfall is so heavy and the timber growth so dense that melting snow, delayed late into

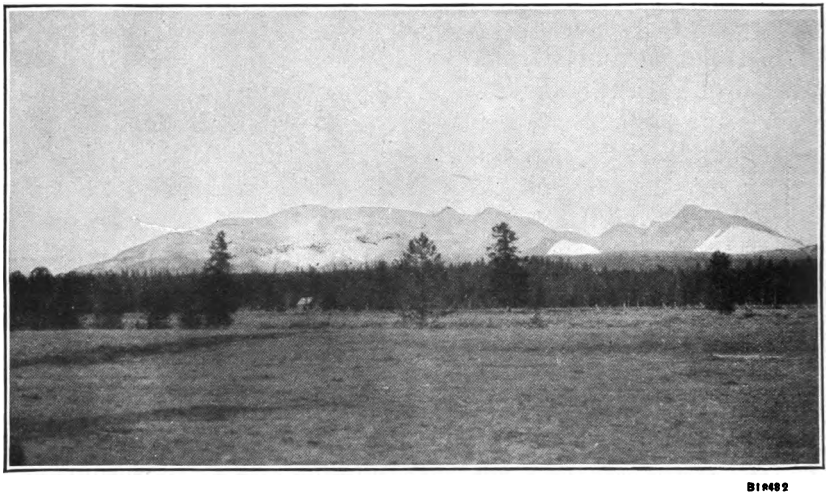

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FIG. 1.—Open Transition Zone valley. Yellow pines on and along edge of Big Prairie in North Fork Flathead Valley, looking east to Vulture Peak. April 16, 1918.

spring by the cool forest shade, favors the plant growth and the animal life of the Canadian Zone, which dominates the valleys.

CANADIAN ZONE.

The Canadian, which comprises the well-timbered areas of the park, is the most extensive of the four life zones. It reaches from practically the base of the park all around up to altitudes of approximately 6,000 feet on northeast slopes and 7,000 feet on southwest slopes, varying somewhat with the steepness and soil cover and with the amount of sunlight allowed to reach the surface of the ground. Most of the zone is covered by heavy forests of lodgepole pine, Engelmann spruce, subalpine fir, aspens, black cottonwood, and mountain maple, but over the lower part of the west slope of the

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park the predominating forest trees are yellow cedar, western hemlock, western tamarack, grand fir, Canada spruce, paper birch, western yew, and devil's-club, which give a western character to the forest, strikingly resembling that of the Pacific slope of the Cascade Mountains.

The shrubby growth of the zone is characterized by an abundance of alders, numerous species of willow, mountain ash, shrubby birch, shrubby juniper, Canadian buffalo-berry, red-berried elder, black-berried elder, *Pachystima myrsinites* (an abundant little evergreen shrub), red-berried and black-berried honeysuckle, thimbleberry, gooseberry, currant, purple mountain blueberry, little red blueberry, a great abundance of smooth *Menziesia*, and a little rusty *Menziesia*. Among the many conspicuous flowers of the zone are the tall, white globes of the bear paw, bear grass or squaw grass, the great yellow western dogtooth violet (*Erythronium grandiflorum*), the green-flowered hellebore (*Veratrum viride*), the pine lily (*Clintonia uniflora*) like a white star on the lacelike forest carpet of *Tiarella*, the yellow columbine, the deep-blue larkspur, light-blue *Clematis*, and baby-blue false forget-me-nots, the purple and the blue *Pentstemon*, the magenta Indian paintbrush in the open and the rose-red *Mimulus* along the streams, the golden *Arnica* in the woods in midsummer, and later the goldenrod and purple asters and tall pink fireweed.

The common mammals of the Canadian Zone are moose, elk, mule deer, white-tail deer, red squirrel, flying squirrel, yellow-bellied and forest chipmunks, gray-mantled ground squirrel, Columbia ground squirrel, bushy-tailed woodrat, white-footed mouse, red-backed mouse, Rocky Mountain lemming mouse, long-tailed and big-footed meadow mice, beaver, porcupine, jumping mouse, brown pocket gopher, snowshoe rabbit, Canada lynx, red fox, gray wolf, northern coyote, marten, Arizona weasel, grizzly bear, black bear, and the water, dusky, masked, and Dobson shrews.

A few of the characteristic birds are the loon, Barrow golden-eye, and harlequin ducks, Franklin, Richardson, and ruffed grouse, golden eagle, goshawk, Cooper and sharp-shinned hawks, pileated woodpecker, Arctic and Alaskan three-toed woodpeckers, hairy woodpecker, red-naped and Williamson sapsuckers, black-headed blue jay, Rocky Mountain jay, Clark crow, crossbill, siskin, junco, white-crowned sparrow, gray fox sparrow, cedar waxwing, Wilson, Audubon, and Macgillivray warblers, water ouzel, winter wren, Rocky Mountain brown creeper, red-breasted nuthatch, mountain chickadee, ruby-crowned and western golden-crowned kinglets, the northern varied thrush, Audubon hermit and olive-backed thrushes, and the mountain bluebird.

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HUDSONIAN ZONE.

The Hudsonian, or timberline, zone is a narrow belt around the peaks about 1,000 feet in average vertical width, reaching generally from 6,000 to 7,000 feet in altitude on the cold northeast exposures and from 7,000 to 8,000 on the warmer southwest exposures. On very steep slopes it often runs beyond these average limits, falling lower on cold and rising higher on warm exposures. Its borders are very irregular, but across a canyon its upper edge may be readily traced on opposite slopes by the fingertips of dwarfed or prostrate trees, while below it melts into the solid Canadian Zone forest. It has far more open than timbered areas and includes cliffs and extensive rock slides and snow banks. In midsummer it is the most attractive zone of the mountains, with its brilliant flower gardens carpeting the open slopes and grassy meadows, its miniature forests and scattered groves of dwarfed and wind-beaten timber, its unusual bird and animal life, numerous snow banks, little lakes and roaring rivulets, cool, fresh air, and glorious mountain views, all combining to make of it an inspiring camp ground.

Its dominant tree is the small white-barked pine (*Pinus albicaulis*), but the dwarfed mountain tamarack (*Larix lyelli*) is occasionally found. The Engelmann spruce and subalpine fir also occur in stunted, dwarfed, and windswept forms, reaching to extreme timberline, although their real forest growth is confined to the zone below. Shrubby vegetation is scarce except for dwarfed willows, the purple and white heathers (*Phyllodoce empetriformis* and *P. glanduliflora*), Rocky Mountain laurel (*Kalmia glauca*), mountain gooseberry, and dwarf blueberry. The conspicuous flowering plants, however, are legion and are often massed in areas of almost solid color. The great yellow dogtooth violet fills this zone as well as the Canadian Zone below and at times gives a dominant color to the slopes. The large white flowers and woolly heads of the west-wind flower (*Pulsatilla occidentalis*), the creamy globe flower, and the milk vetch are abundant and conspicuous, the creamy, roselike *Dryas octopetala* often carpets the ground, and many species of saxifrage are found, with the little white *Arenaria* and *Stellaria*. The blues are conspicuous in the little larkspur, the Jacob's-ladder (*Polemonium viscosum*), a water leaf (*Phacelia*), Venus's-looking-glass, and the deep-blue gentians. The reds and pinks and purples are shown in Indian paint brushes, mountain evening primroses (*Godetia quadrivulnera*), louseworts, elephant heads, and *Pentstemon*. The yellows of buttercups, cinquefoils, and golden asters, and the orange of *Arnica*, hawk-weed, and *Senecio* are conspicuous.

Among the mammals are white goats, mountain sheep, hoary marmots, conies, and alpine chipmunks, while the Columbia ground

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squirrel occupies the lower part of the zone, as do also to some extent the mantled ground-squirrels and yellow-bellied and big-tailed chipmunks.

The conspicuous birds are the ptarmigan, rosy finches, pipits, siskins, crossbills, and white-crowned sparrows, while many of the Canadian Zone species come into the lower edge of the zone, and golden eagles are often seen around the peaks and cliffs.

ARCTIC-ALPINE ZONE.

The Arctic-Alpine Zone caps the peaks and extends on cold slopes below many of the passes to 7,000 feet and on warmer slopes to 8,000 feet. It lies entirely above the last trace of timber and dwarfed trees and includes most of the glaciers and large snow fields, great expanses of barren cliff and rock, and also extensive areas of thin soil and depauperate vegetation. For the greater part of each year it is buried in snow, but during the short summer every available bit of fertile soil is carpeted with green or is bright with alpine flowers, and even the cracks and niches in the rocks shelter hardy plants that defy wind and storm and frosty nights.

There are no trees or upright shrubs, but many of the plants have woody stems and most have unusual root development to enable them to withstand such adverse climatic conditions. Several species of dwarf willows grow as carpets with leaves and stems flat on the ground and each plant sends up a single tiny catkin of flowers and fruit, often less than an inch from the surface of the ground. Cushions of mountain pinks (*Silene acaulis*) lend color to the slopes as do also the deep blue Jacob's-ladder, and dwarf blue columbine, the alpine harebell, the little fragrant beds of forget-me-nots, many species of saxifrage, a delicate pink spring beauty, a dwarf bitterroot, tiny crimson shooting stars, yellow *Sibbaldia*, buttercups, and cinquefoils.

Of mammals there are none restricted to this zone, though in summer the white goats and mountain sheep spend their days mostly in it, usually coming down into the edge of the Hudsonian to feed at night, and in winter the goats remain chiefly on its wind-swept ridges. Hoary marmots and alpine chipmunks often run up into it but really belong to the zone below.

Birds of many species fly over and wander into the zone, but the only one breeding entirely within its boundaries is the gray-crowned rosy finch. The ptarmigan and pipit are often found high in this zone in summer, but apparently breed mainly lower down in the Hudsonian.

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While the zone lacks elements purely utilitarian, it is supremely endowed with the highest type of the esthetic. Its lofty mountain peaks crowned with the glories of sunlight and snow have inspired the nature-loving native to regard them as connecting links between earth and heaven. To the more learned mind they are an equal inspiration, as in their beauty and grandeur they rise far above the good green fields, with strong appeals to come up higher and stand in the clear light and gaze far and wide over the tiny fields of man below and then off over the sea of giant peaks that challenge the strongest fibers of mind and body.

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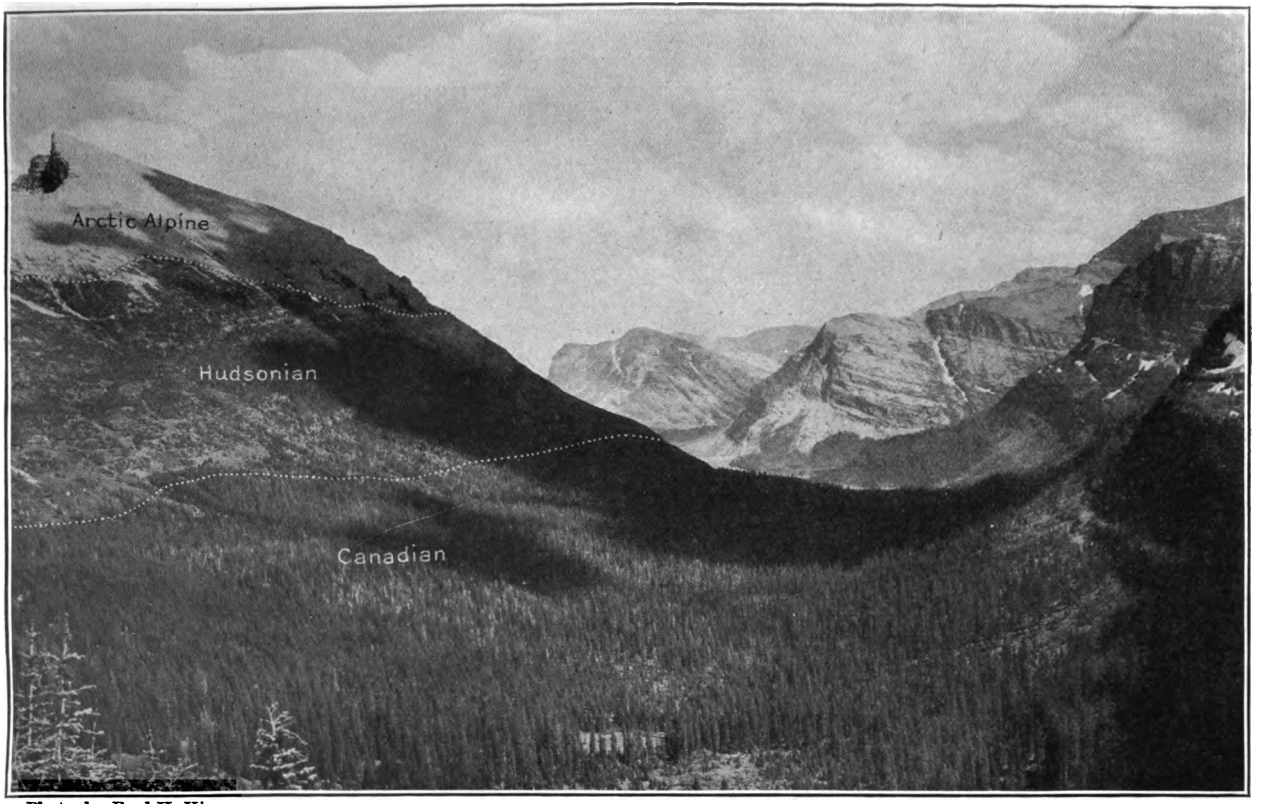

Photo. by Fred H. Kiser.

LIFE ZONE SECTION ON SLOPE IN GLACIER PARK.

Canadian Zone forest of spruce and fir in foreground. Hudsonian Zone forest of scattered dwarf timber above. Arctic Alpine Zone above dwarf timber.

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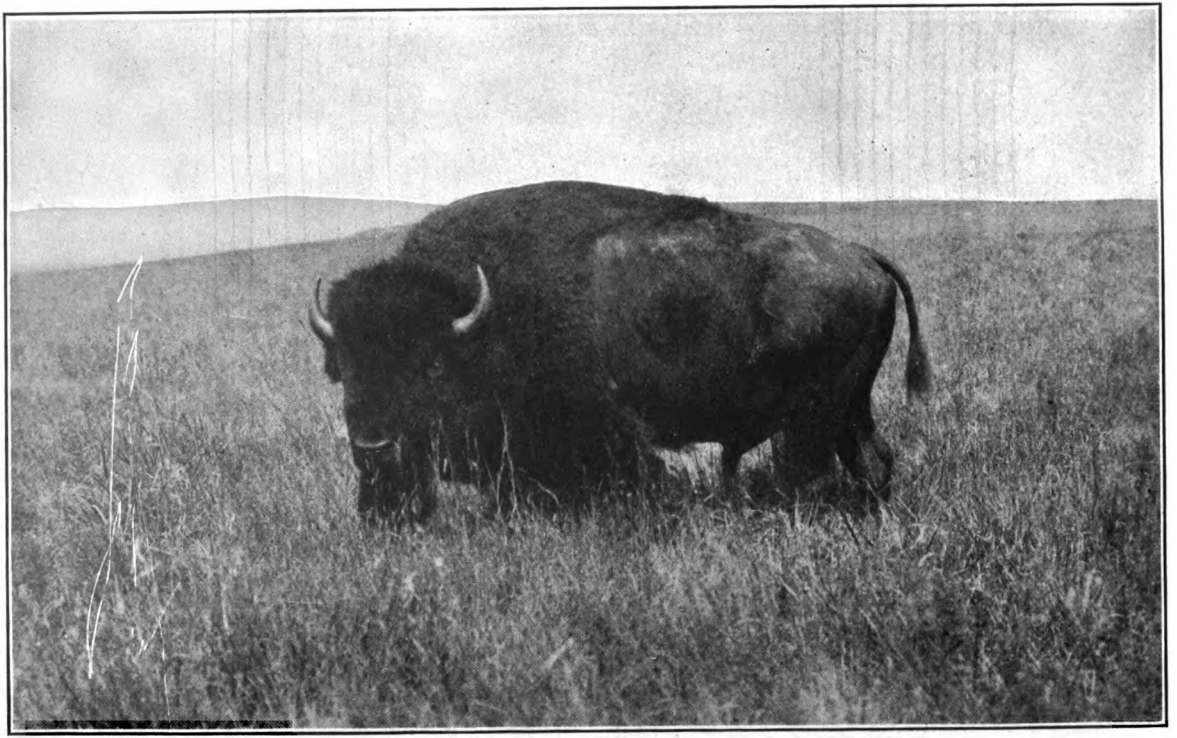

Photo. by Henry W. Henshaw. B14459

BUFFALO BULL ON THE FLATHEAD BISON RANGE NEAR DIXON, MONTANA.

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THE MAMMALS.

By VERNON BAILEY.

In addition to its natural beauties and wonderful scenery, the Glacier National Park contains a goodly variety as well as a great number of large game animals. The bison have vanished, but the white goats, mountain sheep, moose, elk, mule deer, white-tail deer, and grizzly and black bears are present in abundance, while many of the smaller mammals are numerous and so unafraid that they constitute a great attraction to the visiting public. Under the careful protection afforded by the park most of the species are increasing and will be easily maintained in sufficient abundance to perpetuate the natural fauna over a wide area of public domain.

Properly to protect and control the animals within the park and to make the interesting species accessible to the visiting public, it is necessary to learn as much as possible of the life history of each. Unfortunately many of the obscure habits of the commoner mammals are still unknown, but by putting on record our present knowledge, the accumulation of additional information will be encouraged and the interesting study of home habits of the animals will be made possible for a greater number of people who have the time and interest to pursue it.

The present report is based on field work carried on by the United States Bureau of Biological Survey from May 20 to June 26, 1895, and from July 5 to August 30, 1917, and on information gathered from rangers, guides, and other residents in and around the park.

Order UNGULATA: Hoofed Animals—Cattle, Sheep, Goats, Antelope, and Deer.

Family BOVIDÆ: Cattle, Sheep, and Goats.

BISON; BUFFALO: *Bison bison bison* (Linnæus).—The plains along the eastern edge of Glacier Park were once a famous stamping ground for the buffalo and hunting ground for the Blackfeet Indians. These

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were among the last hunting grounds in the United States from which, about the year 1884, this noble game animal vanished. In 1895 buffalo bones were thickly strewn over the prairies along the eastern edge of the park, although they had been gathered up everywhere within a day's drive of the railroad and shipped away for commercial fertilizer. They were numerous on the edge of the prairie at the lower end of St. Mary Lake, and skeletons were found in all the little open prairie strips well back into the timber along the sides of the lake. In 1917 few bones were to be seen, but old skulls are still picked up in the thickets and among the rocks well back into the narrow valleys and edge of the timber of the eastern border of the park, and many of these may be seen at the park hotels and chalets, at ranger stations, and ranches along the border. In the timber just west of McDermott Lake on the Swiftcurrent Creek in 1917 I found a half-buried skeleton in the humus of the pine woods and picked out an almost perfect vertebra with a 14-inch dorsal process, which once helped to support the high shoulder hump of an old bull. At the ranger station on Belly River, just inside the park line, two skulls were seen in a fair state of preservation, and numerous grassed-over trails leading from the steep slopes of the benches to the river bottoms showed where the buffalo had at one time occupied this valley in great numbers. At the ranger station on the North Fork of Kennedy Creek was a fairly good skull with two old horns that had been picked up in that vicinity. At Waterton Lake a good buffalo skull adorned the front of the ranger station just inside the park line, and at the north end of the lake under our camp woodpile I uncovered an old skeleton of a bull bison. There are no live buffalo in the park at present, but some ideal sections of their original range could be inclosed, where a few of these animals could thrive the year around with little or no care or expense, and add one more to the many attractive features of the park. The climate is less severe than that where the wild herd now winters at 8,000 feet altitude in the Yellowstone Park, and the conditions would be more favorable for an all-year range.

MOUNTAIN SHEEP; BIGHORN: *Ovis canadensis canadensis* Shaw.—Mountain sheep are abundant on practically all the high, rugged ranges throughout Glacier Park, especially on the rocky slopes above Two Medicine Lakes and around Chief and Gable Mountains. In summer they scatter out over the high and more inaccessible ridges above timberline and are less conspicuous than the white goats, but during the winter they come down on the lower slopes and, especially in spring and early summer, are much in evidence along the roads and trails in the more accessible parts of the park. Park Ranger W. S. Gibb counted 207 sheep in March, 1917, on the slopes near Many Glacier and photographed them at close quar-

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ters along the road and around the chalets there. He says that they may be seen any day during early summer from the Many Glacier Hotel. Probably no one is more familiar with the sheep and their range and abundance over the whole park than Mr. Gibb, but he insists that a reliable estimate of their numbers would be impossible. From many local reports, in many places in the park, however, I am convinced that the number can not be less than 2,000. In winter many sheep come down along the rocky slopes east of Waterton Lake and spend a part of each year on the Alberta side of the line, returning in summer to the high ridges, of which Mount Cleveland is the culmination point. The Canadian Government has wisely created a national park on its side of the international boundary, which effectively protects the animals that wander back and forth from one country to the other, as well as giving free access to the tourists who wish to visit the northern end of the Glacier Park without getting out of protected areas. To a certain extent the sheep are migratory, but in a vertical direction, traveling during the late summer from the highest peaks down to the lower rocky and warm slopes, where in winter they can find abundant food and still be on ground rough enough for them to have the advantage over most of their natural enemies.

Their food in summer consists largely of the leaves, buds, and seeds of a great variety of shrubby and herbaceous plants, as well as some grass, but as a general thing mountain sheep are not grass-eaters. In winter they take the rough slope and cliff vegetation as it comes, browsing off whatever is exposed above the snow or projects from the cracks and crevices of cliffs and ledges, whether it be the buds and tips and leaves of shrubs or tops and stems of dry grass. They also tramp and paw to the ground for the low vegetation under the snow, and eat the green and dry plants, including grass and sedges, and even the close carpet of mosses and lichens, until the ground is left with a bare surface on some of their favorite feeding slopes. Stevenson says they even dig up the roots on slopes where they can get at the ground. They are good rustlers and usually come through the winters in good condition.

The young are apparently mostly born in June, as in 1895 I found many herds of ewes up to the last of May and among them only one young lamb, on May 25. Mr. Gibb tells me that he has often found two lambs with one ewe and thinks that this is not an unusual number of young. During the summer the rams and ewes usually travel in separate bunches, but occasionally a mixed herd is found.

Their summer trails lead up over steep slopes and along the faces of cliffs on narrow shelves and ledges that from below are lost to view, and the animals seem to be climbing perpendicular walls. When actually following their trails, however, I have found none of

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them which a man well shod and used to the mountains could not travel, and others who have been long familiar with the animals on the native peaks are frank to say that a man can go anywhere that they do. From the highest and most inaccessible slopes where they spend the summer days the sheep are forced to descend at night or at certain times to lower levels where they may obtain their food from the scanty growth of alpine meadows. It is probable that they would remain throughout the day at these more accessible levels but for their persistent enemies, the big mountain coyotes, which prowl along the trails and over the slopes as high as their unshod feet will allow them to travel with comfort. Apparently these are the principal enemies of the sheep, and if their destruction could be accomplished the sheep would increase more rapidly and would be more conspicuous along the trails and over the mountain passes during the tourist season. As the sheep meat is considered by many the most delicious of all game meats, the animals are not easily protected from poachers outside the park areas, but with the excellent ranger service they should steadily increase in the park until it is stocked to its full capacity, when they will overflow into neighboring ranges where hunting may at some time be resumed.

FIG. 2.—Head of 5-year-old ram from Chief Mountain country. Mounted and photographed by H. H. Stanford, Kalispell.

MOUNTAIN GOAT: *Oreamnos montanus missoulae* Allen.—White goats are common on all of the high peaks and ridges throughout the park. During the tourist season they are generally found above timberline or from the last scrubby growth of timber up to the tops of the highest peaks. Occasionally the goats or their tracks were seen where the animals crossed from one range to another, along some of the trails well down in the timber, and little festoons of fine white goat wool were found on bushes along the trails near Elizabeth Lake on the head of the Belly River, and in the upper part of Waterton Lake valley. While the goats do not make the same vertical migration up and down the slopes as the mountain sheep, they wander considerably and keep some of the trails well worn between the different ranges. Unless disturbed by their enemies, their travel is mainly in daily trips up the slopes to high ledges and shelves during the morning hours, often to the very crests

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Photo. by M. P. Skinner. B901M

FIG. 1.—A BAND OF OLD RAMS NEAR JUNCTION BUTTE IN YELLOWSTONE PARK.

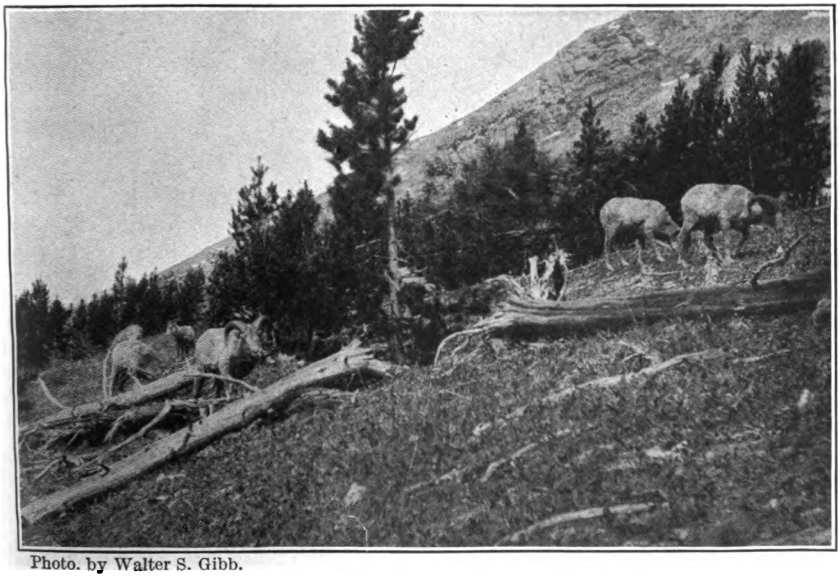

Photo. by Walter S. Gibb.

FIG. 2.—MOUNTAIN SHEEP JUST BELOW TIMBERLINE IN GLACIER PARK.

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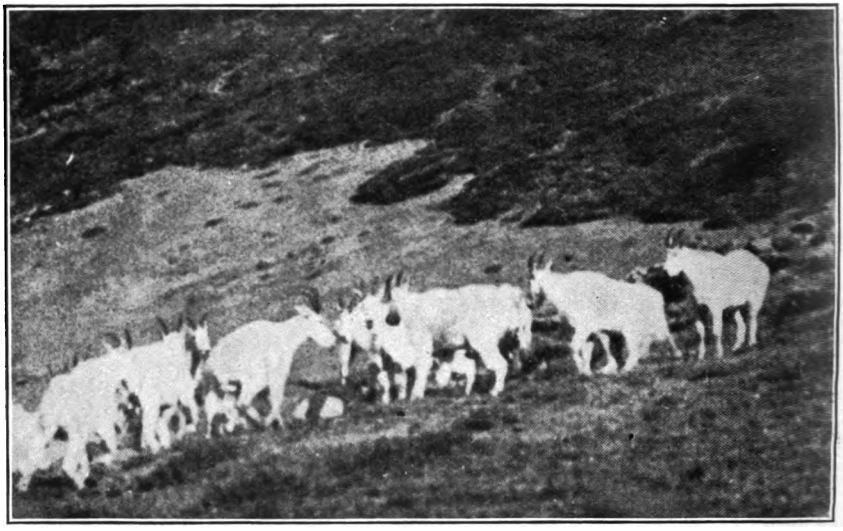

FIG. 1.—A BUNCH OF MOUNTAIN GOATS IN ALPINE MEADOW

Courtesy New York Zoological Society. B1114M

FIG. 2.—MOUNTAIN GOAT IN BRONX PARK, NEW YORK CITY.

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of the highest ridges and peaks where they seem to feel safe and can sleep until the sun gets low in the west. Usually about 4 or 5 o'clock they begin to come down from the steep cliffs and crags and before dark are feeding in the little alpine meadows not far above timberline. These daily climbs are evidently imposed upon them by the big mountain coyotes, which are constantly prowling along the trails and over the open slopes as high up as they dare go in search of young goats and sheep or other game. Over any of the high passes in the park, as Two Medicine, Gunsight, Piegan, Swiftcurrent, and Kootenai, goats may be seen from the trails, especially in the early hours of the day before they have worked up to the crests of the ridges. At Iceberg Lake they may be found in the morning almost without fail down near the trail, and later in the day may be seen as white specks lying on the shelves of the great cirque which rises steeply back of the lake. Their trails thread the narrow shelves and go up step by step through niches and narrow clefts to the very summit of the Garden Wall, which here forms the Continental Divide. Some of these trails, which I followed out through what seemed to be inaccessible heights, were not difficult when I tried them with rough-shod boots and sharp staff, although in many places four legs would have given a better footing than only three. The heavy, square hoofs of the goat afford a most perfect climbing and clinging surface for rock work, and are used with great skill and steadiness. The goats are phlegmatic animals, apparently without nerves, and one is compelled to admire their self-possession in situations where a misstep would mean sudden death.

In June of 1895, while climbing the east side of Going to the Sun Mountain for a particularly fine specimen of an old billy goat, I kept an eye on an old nannie and her kid resting on a narrow shelf high on the face of a cliff that seemed perfectly sheer in its descent for a thousand feet below them. Presently a roar and crash impelled me to lean toward the mountain side and make sure of my footing before looking around to see a great mass of ice from the front of the Sexton Glacier thundering down, to be ground into a cloud of foamy dust on the rocks hundreds of feet below. The prolonged roar and heavy vibrations from the mass of grinding ice fairly shook the atmosphere if not the mountain side, and after my first impulse to cling to something stable was the thought of the effect on the old goat and kid located on the narrow shelf midway between me and the avalanche. I expected to see them come dashing along the ledge toward me, and was eager to see how they managed the narrow foothholds, but, much to my surprise, they seemed to take no notice of the disturbance and did not so much as get up out of their beds on the narrow shelf. The whole display was in plain view from their niche, but evidently it was a commonplace affair to them.

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A little later, in plain view of the two goats, an old grizzly bear and her cub crossed one end of the glacier somewhat below, but caused no excitement, and my presence on the other side on a level with them seemed not to be noticed. The security of their position apparently banished all fear, but in more accessible places they usually show as much caution and timidity as other game animals under the same conditions of danger. Like many of the high mountain species of animals, however, the goats are usually so unfamiliar with man and his destructive habits that for a game animal they are comparatively tame.

In winter they seek the crests of the ridges at high altitudes, where the snow is swept from the dwarf plant growth and food is always available. Their dense coats of silky wool seem to be proof against the severest cold and storms, but during a strong wind they seek the sheltered side of the mountain or the protection of cliffs and rocks and even caves. Above Iceberg Lake I found the well-used beds back under little shelves of rock where the kids had apparently taken shelter from wind and rain. Near Sexton Glacier, on the side of Going-to-the-Sun Mountain, I saw two old goats emerge from shadowy caverns in the rocks which had entirely concealed them during the day. On the side of Chief Mountain, among the big bowlders far above timberline, I tried to bring an old goat and her little kid closer to me by throwing stones below them, but instead of coming up where I was they quickly took refuge under the side of a huge bowlder and refused to leave their shelter when the stones were striking the rocks beyond them. In a few cases I was able to get near enough to watch them feeding on the small mountain plants, but could not distinguish clearly which they selected for food. Apparently they grazed at random among the little dwarf willows and in the beds of short mountain grass and sedges, where a great variety of other plants also were bedded together. Individual plants of a little water leaf (*Phacelia*) and mountain sorrel (*Oxyria digyna*) had been eaten off and seemed to be rather favorite foods. Of their winter food little is definitely known.

Early in July the kids were well grown and probably about a month old. Generally each mother goat was followed by one young, but Ranger Gibb tells me that in a number of cases he has found two young following one old goat, and he thinks that twins are not rare among them. The young of a month old seem to be as much at home as their parents in climbing the cliffs and difficult trails, and they even frisk on the steep snowbanks and walk the narrow crests of ice and snow drifts for the mere sport of doing difficult stunts.

If their principal enemy, the coyote, were destroyed, it is probable that the goats would be much more common along the trails and at

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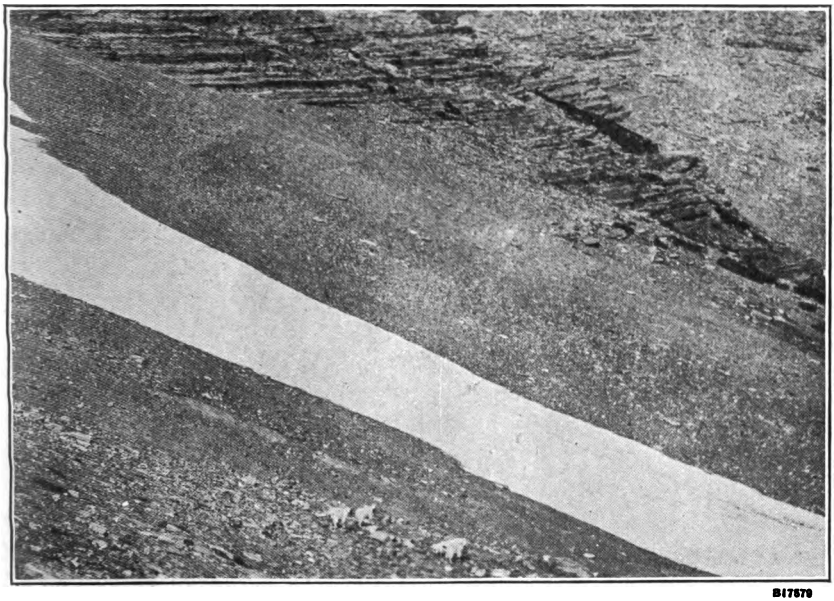
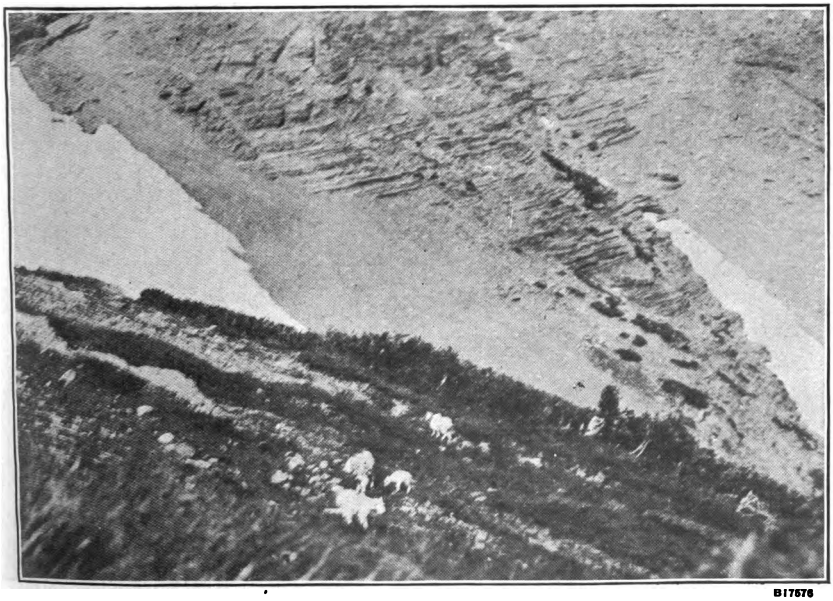


B17679

FIG. 1.—A FAMILY OF GOATS ON THEIR WAY DOWN THE MOUNTAIN SIDE TO THE MEADOWS WHERE THEY FEED.



B17676

FIG. 2.—THE SAME FAMILY OF GOATS FEEDING IN AN ALPINE MEADOW NEAR SEXTON GLACIER AT 4 P. M. ON JULY 28, 1917.

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levels where the tourists could be on more intimate terms with them. Apparently they are holding their own and increasing somewhat, in spite of the fact that coyotes prey upon them to a considerable extent, as is indicated by droppings along the higher trails, which are composed largely of goat wool and the hair of mountain sheep. As goats are one of the greatest animal attractions in the park, their protection should be as complete as possible, and every care should be taken by visitors to avoid disturbing or frightening them.

Family ANTILOCAPRIDÆ: Prong-horned Antelope.

PRONG-HORNED ANTELOPE: *Antilocapra americana americana* (Ord).—At the present time there are no antelope in the Glacier Park, and even back in 1895 there were said to be none there or on the Blackfeet Indian Reservation, although they were then common and still are found to the east and south of this area. Their absence is undoubtedly due to the persistent hunting which followed the disappearance of the buffalo, as they must have ranged into the eastern edge of the park in open strips of prairie, such as are found at the lower end of St. Mary Lake and along the Swiftcurrent and Belly Rivers. If a buffalo pasture were inclosed in one of these warm, open valleys, it would serve also as a suitable yearlong range to a few of these rare and interesting animals.

Family CERVIDÆ: Moose, Elk, and Deer.

AMERICAN MOOSE: *Alces americanus americanus* Jardine.—A few moose are at present found along the east slope of the park in densely wooded and swampy valleys, such as those along Two Medicine Creek, Red Eagle Creek, Upper St. Mary River, upper Swiftcurrent Valley, and the branches of Belly River and the upper Waterton Valley, while on the west slope they are far more numerous in the valleys tributary to the North Fork of the Flathead River. In the valleys above McDermott Lake, Ranger Gibb reports a cow and calf and one bull moose during the summer of 1917, and says there are a few in the valley on the South Fork of Belly River. In August I saw one moose and a few tracks around the upper end of Glenn Lake, on the North Fork of Belly River, and a few moose tracks along the shores of McDonald Lake. J. E. Lewis tells me that in July, 1917, an old bull moose swam across the lake in plain view of the guests of the hotel. He says there are a large number of moose on the west slope of the park north of Little St. Mary Creek and all up through the North Fork Valley, but that they are rare in the country south of Little St. Mary Creek, which is mainly elk range. Ranger Gibb says that in winter considerable numbers of moose yard near the mouth of Dutch Creek and on Camas Creek,

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while other winter yards are found along Logging Creek and one opposite the mouth of Starvation Creek. He would make no estimate of the number of moose occupying this region, as, even with his intimate knowledge of their range for many years, such an estimate would be a mere guess; but, from what he and other guides and rangers and other residents of the country have told me, it seems safe to place the probable number in the park at several hundred individuals.

In 1895 I was told that moose were then more numerous in the park than elk. Two had been killed that spring near St. Mary Lake and others were reported in the valleys west of Upper St. Mary and Red Eagle Lakes. At Summit Station I was told by a man who had been there for several years, and had hunted and trapped in the country now included in Glacier Park, that moose were common in the northern part of the region, but were being rapidly destroyed by trappers for bear bait. He estimated that for 100 bear that he had known to be caught in that region no less than 500 moose and elk had been shot for bait, and of these more moose than elk. He acknowledged that he and his partner during one spring's trapping had killed about 70 moose and elk for bait. While it is to be hoped that this practice has been greatly lessened in recent years, it is common knowledge that bear trapping generally is a serious menace to the large game of any region. The moose are evidently increasing in the park at present and are spreading to other valleys where they were formerly numerous. The great extent of dense forest, containing lakes, marshes, and willow thickets, constitutes ideal moose range over a large part of the park, where many thousands of the animals could range at will without interfering with other kinds of game.

American Elk; Wapiti: *Cervus canadensis canadensis* Erxleben.—A few elk are still found along the east slope of the Glacier Park, but they are scarce, shy, and widely scattered in small bunches. Early in the spring of 1917 nine were reported killed by the Indians where they had been forced down by the heavy snows. In July I found fresh tracks in the timber near Two Medicine Lake and a few tracks in Roes Basin north of St. Mary Lake, and learned that a few elk were reported around Red Eagle Lake the previous fall. Donald Stevenson reported eight seen at the salt lick near Upper St. Mary Lake in 1912, and a few on Swiftcurrent Creek in 1915. In August, 1917, I found old winter elk sign on the warm slopes of Belly River valley near the park boundary, where a few elk had lived during one of the preceding winters. In all, there may be 50 elk along the east slope of the park, and it is doubtful if they are holding their own against the severe climate and the necessity of coming down on to the Indian Reservation in winter, where they are unprotected. On the

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west slope of the park there are a few elk along the Middle Fork of the Flathead River from Little St. Mary Creek southward, where they occupy the high valleys and ridges during summer and the lower warm slopes in winter. In the spring of 1918 about 500 were reported as having wintered on the slopes of Double and Rampage Mountains and in Park Creek valley. The main elk range of this region, however, lies south of the park along Big River and the South Fork of the Flathead River, and some of these animals undoubtedly wander through the park at times. The southern and eastern part of Glacier Park contains much ideal elk range, and if suitable wintering grounds could be provided where the animals would be safe from molestation their numbers would undoubtedly increase until the country would become well stocked.

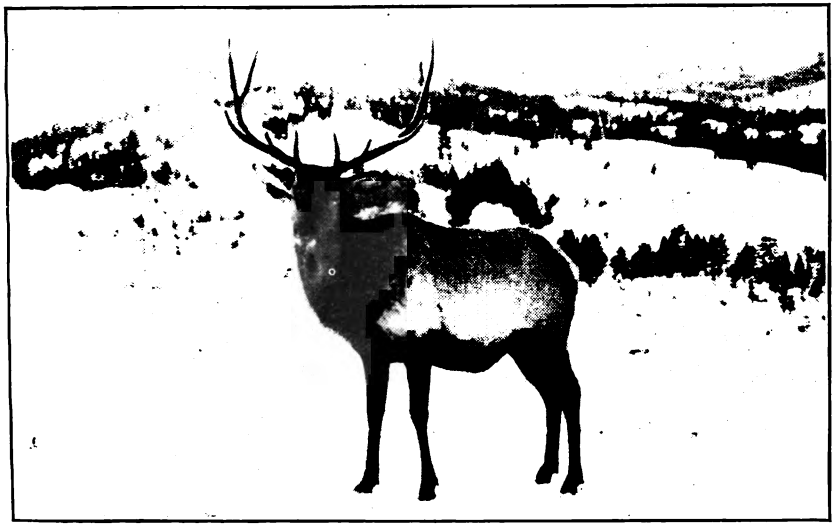

FIG. 3.—A five-point bull elk in early winter.

MULE DEER: *Odocoileus hemionus hemionus* (Rafinesque).—The Rocky Mountain mule deer are readily distinguished at all ages from the smaller white-tail deer by their very large ears, small, white tail with black tip, and conspicuous white rump patch, and the old bucks by their forked antlers. They generally average considerably larger than the white-tails, but size is not a safe distinguishing character. It is important to distinguish them, for a few of each are found on both slopes, although the mule deer keep for the most part to the east and the white-tails to the west slope, and both range into the high mountains in summer, when they may be found close together. In July, 1917, mule deer were seen at the lower and upper ends of St. Mary Lake, at McDermott Lake, and along the Swift-

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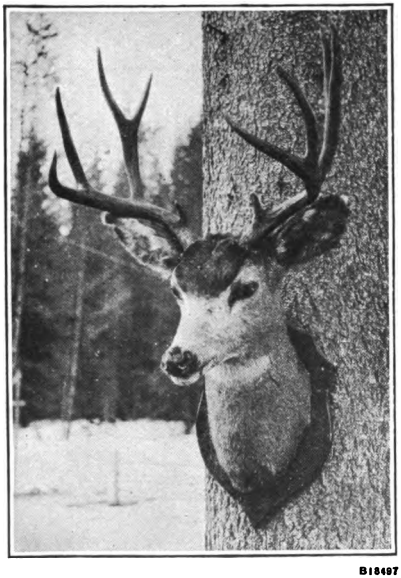
current River; and in August their tracks were common along Kennedy Creek, Belly River, and in the Waterton Lake valley. Most of those seen were does and fawns, and close to the buildings at Sun Chalet an old doe and her spotted fawn were seen almost every day, up to July 25. During July and August many tracks and a few old bucks were seen near timberline along the crest of the range. At Granite Park, July 18, five bucks in red summer pelage, with velvet-covered horns were seen together. A buck with horns in the velvet was several times seen near Piegan Pass in the upper edge of the Hudsonian Zone, and fresh tracks were seen near the Blackfeet Glacier and in many other of the high sections, but the tracks do not usually distinguish the species. Generally, in midsummer, the bucks are at the upper edge of timber, where troublesome flies and mosquitoes are swept away by the wind, while the does hide their fawns in the deep woods and thickets of the lower levels and depend on the dense cover and water for protection from insect pests. There is much shifting back and forth as the deer are disturbed, and their tracks often show along the trails for considerable distances. During the year there is also a well-defined migration from the high-up range of the bucks in summer down to the steep, warm slopes of the lower valley sides in winter. At the lower end of Waterton Lake 75 or 100 mule deer were estimated last winter to be along the warm rocky slopes. Considerable numbers are said to winter along the warm slopes of Swiftcurrent and St. Mary Lake valleys, where bare slopes may usually be found and where browse and winter food are abundant. Some drift out of the park and are killed, but apparently the deer are steadily increasing with the protection afforded them by the park rangers. With the abundance of choice food and favorable wintering grounds many thousands of deer could occupy these slopes, instead of the few hundred now to be found, but with the present numbers of the large timber-inhabiting coyotes, which are constantly prowling for fawns, there can be no rapid increase of such game animals.



B18497

FIG. 4.—Head of mule deer killed on Huckleberry Mountain. A perfectly normal head of buck with doubly forked antlers, large ears, and strongly contrasted face markings.

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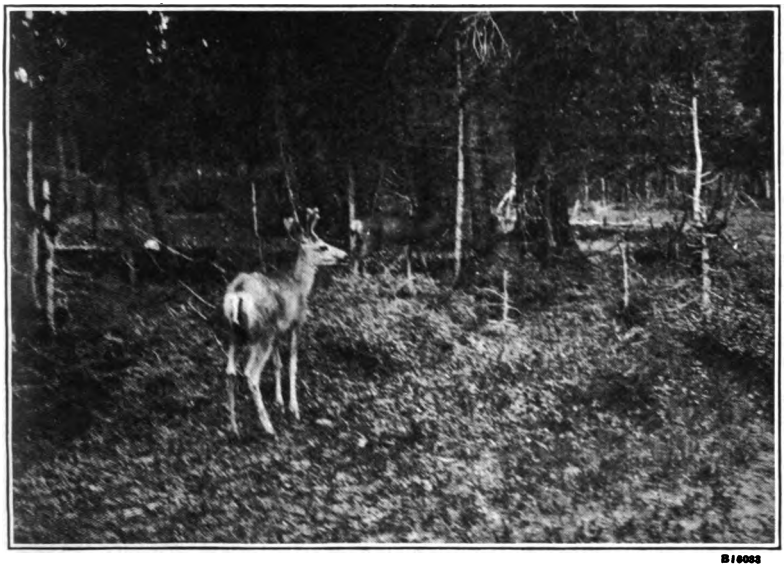

B16083

FIG. 1.—MULE DEER BUCK IN SHORT SUMMER RED COAT AND VELVET HORNS, YELLOWSTONE PARK.

Photo. by Norman J. McClintock. 1020M

FIG. 2.—MULE DEER GATHER ABOUT FORT YELLOWSTONE TO BE FED IN WINTER AND BECOME VERY TAME.

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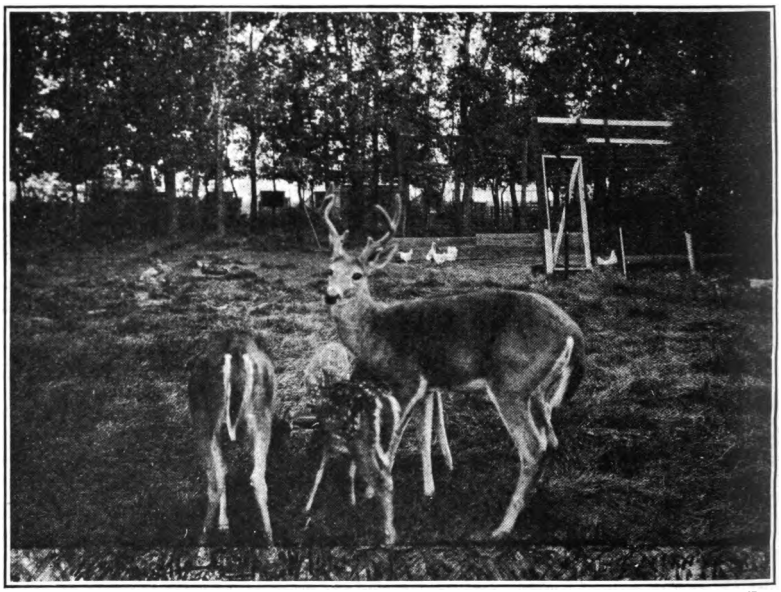

B15577

FIG. 1.—WHITE-TAIL BUCK AND DOE AND FAWN IN SUMMER RED COATS. TAME DEER CAPTURED NEAR WILLISTON, N. DAK.

Photo. by Albert Schlechten.

FIG. 2.—WHITE-TAIL DOE IN LONG GRAY WINTER COAT, IN YELLOWSTONE PARK.

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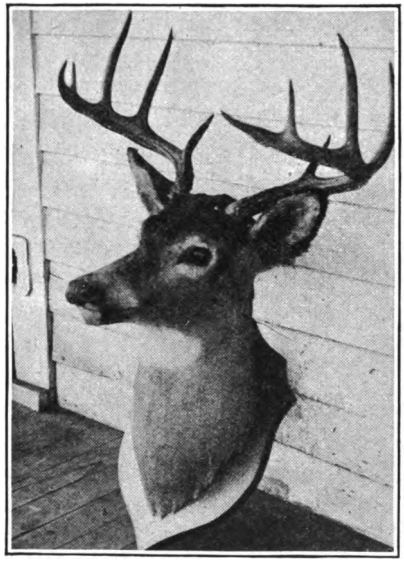
WESTERN WHITE-TAIL DEER: *Odocoileus virginianus macrourus* (Rafinesque).—These small, graceful yellow deer are readily distinguished from the larger mule deer by their long, bushy tails, which show white only when raised, by their small ears, and in the bucks by horns with a single beam and upright prongs. The white rump patch of the mule deer is lacking, but in running the tail of the white-tail is thrown up and the long, white hairs are spread at will, making an enormous fan-shaped flag that is far more conspicuous than the white rump patch of the mule deer. White-tails are abundant on the whole west slope of the park but are rarely found in the valleys of the east slope. Their favorite haunts are the meadows, thickets, and deep forests, but in summer a few, especially the old bucks, range high up in the open areas near timberline. The stream banks, lake shores, and little meadows are their favorite feeding grounds, but their beds are found in dense thickets or the deep woods in summer, and their slender tracks dot the margins of every pool and stream and beach throughout this wonderful forested area. Their numbers will never be known, but, judging from the abundance of tracks and the extent of the range, they must run into the thousands. If their enemies, the coyotes and mountain lions, could be kept down, their increase would be so rapid that a great overflow into surrounding areas would inevitably take place. Even in their present abundance they are often seen along the trails and near the hotels and camps in summer. At Granite Park they are common, and in crossing Kootenai Pass from Waterton Lake to Granite Park we saw above timberline near the summit of the pass on the western spur of Cathedral Peak, or what the guides call Flat Top Mountain (not the Flat Top of the map), a beautiful bunch of three bucks and a yearling. They were lying in the shade of rock shelves on the cold slope when first seen at 2 p. m., and allowed the saddle and pack horses to come close up before they spread their great white tails and loped over the ridge ahead of us. They showed very little fear and much curiosity, and would lope a little way in advance and wait



B18600

FIG. 5.—Head of white-tail deer at Belton, Mont., with characteristic single-beam antlers, small ears, and obscure face markings.

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for us to come up, watching curiously, undecided whether to run or stand their ground. While standing watching us they kept raising and spreading their tails and occasionally waving them from side to side, like signal flags. A yearling was especially active in waving its tail, often switching it rapidly from side to side through a full half circle. When the tail was raised and the long lateral white hairs thrown open on each side at right angles to the shaft, a huge white fan, fully a foot wide and a foot and a half high, was produced. This, set above the white hams and belly, screened most of the body color of the deer and explains what seems to be an incomprehensible expanse of white that, as the deer bound away through the brush and woods in great curving leaps, shows one huge flash after another, as if the animals had no other color than white. As they stop and stand with drooping tail the white is practically all concealed and the uniform yellow-brown of summer or light gray of winter renders them inconspicuous, and in slight shadows often invisible. With these deer, directive and protective coloration is often more strongly emphasized than in the antelope, which are usually considered the best illustration of the law of directive coloration.

White-tail deer are social, often running in family parties of an old doe and her two fawns or larger parties of sometimes a dozen individuals. In winter they are even more gregarious and in times of deep snow often yard to some extent, keeping their trails well packed so that free access to moss and browse and bushes insures ample food for the severest weather.

In August they were feeding on the low plants of the Hudsonian Zone meadows and slopes, but I could not determine the actual species of plants selected for food. One old doe seemed to be nibbling at the beds of moss in a little alpine meadow, but she may have been selecting tiny saxifrages or heather or even the low sedges that grow among the white mossy cushions. As elsewhere, their food probably consists mainly of buds, leaves, and browse of a great variety of bushes, with seeds, flowers, and delicate tips of tender plants. In winter the deer are said to feed on the lichens that hang from the low branches in the deep woods, and on the twigs of hemlock, birch, and other trees, together with a great variety of shrubs.

Outside of the park the chief enemies of white-tail deer are bear trappers, hunters, and the predatory animals, while in the park the coyote and mountain lion are practically the only check on their increase. The coyote droppings along the trails on the west slope were composed mainly of deer hair, and as coyotes are numerous in the timber and up the mountain sides, their destruction of both fawns and grown deer is of serious consequence. That they do not confine their killing to fawns is shown by an instance observed just west of the park by W. C. Gird, one of the best-known park guides.

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A coyote following a four-point buck was several times charged by it and driven away, until finally another coyote joined the first and together they quickly caught and killed the buck before Gird could reach them on his horse. A few mountain lions in the park range mainly on the west slope, where the deer are most abundant and form their principal prey. The control of such predatory species is necessary to a good supply of game, even in a region so favorable to game animals as the Glacier Park.

Order RODENTIA: Gnawing Animals.

Family SCIURIDÆ: Squirrels, Chipmunks, Woodchucks, etc.

RICHARDSON PINE SQUIRREL: *Sciurus hudsonicus richardsoni* Bachman.—The only tree squirrels in the park are the little dark-red, bushy-tailed pine squirrels which are abundant throughout the length and breadth of its timbered areas. Through the breeding season of spring and early summer they are quiet and inconspicuous, but late in summer, in autumn, and in winter they are busy, noisy, and much in evidence. As soon as the young are old enough to be out of the nest and take care of themselves their cheery call note—a long, high-pitched, vibrant *cherrrrrrrrr*—is heard all through the woods, most frequently in the early morning, but sometimes throughout their daylight working hours. The Canadian Zone coniferous forest is their home, but occasionally they are found a little below its edges on the eastern slope and slightly into the yellow-pine Transition of the Flathead Valley and also up into the edge of the dwarf timber of the Hudsonian Zone. The overlapping, however, is not more than is usual for a species which fully occupies its zone and scatters out slightly at the edges. The lodgepole pine, more fully than any other tree, marks their full range and furnishes board and lodging for more of their numbers than does any other tree, although every conifer contributes more or less to their food supply. Their nests are placed indifferently in the branches of Douglas or Engelmann spruce, the various pines, balsam, hemlock, tamarack, or cedar.

Before the seeds are fully matured in the cones they begin to serve as food for the squirrels, and when well ripened the cones are cut from pine, spruce, and fir trees in such numbers that the woods often resound with their steady thumping on ground and logs. During autumn great numbers of cones are cut off and stored in little pockets or holes in the ground, under logs, rocks, or brush heaps, or in the piles of old cone scales at the base of feeding trees, where they can be readily found under the deep snows of winter. The long cones of the mountain white pine are cut off and dragged into piles for winter food or eaten on the ground, as they are too heavy to be held and eaten on the branch of a tree. The big nutlike seeds of the scrubby white-barked

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pine near timberline are a favorite food wherever they can be obtained. The little hard cones of the lodgepole pine, with their small seeds, mean hard work for small returns, but they are always abundant and are easily held in the hands and eaten nutlike on the branch of the tree. The small spruce, balsam, hemlock, and tamarack cones are usually well filled with rich, oily seeds which are eagerly sought by the squirrels, unless larger and more desirable seeds are available. As there are no real nuts in the country the cones are stored for winter, and the ample stores usually last the squirrels until the next fall's crop is ripe. In summer many mushrooms and some green plants are eaten, and mushrooms are tucked away in dry places or under the bark or on branches of the trees, where they become well dried for winter food. Late in winter the squirrels evidently feel the need of green food, as they often cut the tips from pine branches and eat the inner bark of the twigs just back of the tips. Some seeds and berries also are eaten in summer, and the squirrels occasionally gather around the camps and hotels for scattered grain, crumbs, and scraps of such food as bread, butter, and bacon.

Each squirrel has its own hunting and storing ground where its winter supplies are gathered and hoarded, and woe to any other squirrel that invades its territory after the storing is begun. Owing to the necessity of each squirrel's providing for its own needs in this manner, the animals become solitary to a great extent, but indulge their social instincts by loudly calling back and forth while at work. In winter they scamper over the crusted snow in great glee and in evident enjoyment of the cold weather and the deep snow through which they burrow to their tunnels underneath. In spring as the snow disappears their network of tunnels made over the surface of the ground is gradually exposed and disappears when no longer needed.

In June the four to six young are born in the big grass nests up among the branches of the trees or in well-lined hollow trunks. For a long time they are naked and helpless, and apparently they do not usually come out of the nests as half-grown squirrels until the latter part of July. They are carefully watched and nursed and fed by the mother squirrel until they have learned the ways of the woods, and by the latter part of August have scattered out, each storing his own winter supplies or all working and storing together as a family for the winter's supply about the old parental tree. Usually the families do not entirely break up before the following spring.

Apparently the cutting of cones and branch tips has no injurious effect upon the forest, and the storing of cones aids in planting and distributing tree growth. The stores of cones are often used by the foresters as the best source of seed supply where tree seeds are being

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gathered. Fortunately for the squirrels they have neither incurred the enmity of man nor are they in danger through their value for fur or as game. Their natural enemies—hawks, owls, foxes, cats, and martens—are not sufficiently numerous to keep their numbers down below the normal, and they are likely to remain as permanent residents of the forests. They are easily tamed and make interesting and attractive pets, whether in captivity or coming only for food to the camps and hotels.

FLYING SQUIRREL: *Glaucomys sabrinus latipes* Howell.—This very large, dark-colored flying squirrel is common throughout most of the timbered area of the Glacier Park, but seems to be most abundant on the west slope and at the lower levels. There are no specimens on record from within the park boundaries, but one that I took in 1895 at Nyack, just across the river from the park, is referred by Howell to *Glaucomys sabrinus latipes*. Another specimen taken at Paola proves to be nearer the slightly smaller and paler *G. s. bangsi*, which not improbably occupies the higher levels and possibly the eastern slope of the park, as it is more closely related to the northern *Glaucomys sabrinus*.

Flying squirrels are so strictly nocturnal, so soft and owl-like in their structure and habits, that they are not often seen except by the naturalist-collector or the professional trapper. They may be common about camps in the deep woods every night, but with their furry feet and softly furred monoplane membranes they glide from tree to tree so noiselessly that they are rarely seen. The collector usually gets his specimens in traps set on logs or stumps in the woods or about some old camp ground or in deserted cabins, where the squirrels come to pick up scattered scraps of food. The trapper finds them frequently in his marten traps set out through the heavy forests and baited with meat, birds, rabbits, or squirrels. The flying squirrels probably get into the traps through curiosity rather than because of a carnivorous taste, and then serve their turn as an attractive bait for the martens. Some trappers have reported dozens and others hundreds of flying squirrels caught on their winter's trap line through this region. The animals are unsuspicious and easily caught in box traps set in the woods, and in this way could be made available for examination and study, but otherwise the only possibility of their being seen by tourists and the visiting public is by awakening them in their nests during the daytime with blows of ax or club on the hollow trees in which they sleep.

Large woodpecker nest cavities in trees are favorite homes for the flying squirrels, but any hollow trunk with a small opening answers their purpose, and it is probable that, like other species, they build the outside nests of grass, moss, and bark fibers on the branches much as do the pine squirrels. In the soft-lined and well-

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protected nests the four to six young are born and nursed by the mother until old enough to come out and gather their own food at night. With their big black eyes, soft fur, and rounded heads they are almost owl-like in appearance as well as habits, and if taken while young become very tame and make delightful pets. They are active all winter, and become so densely furred that the cold has no terrors for them, even at night when it is most bitter. No matter how deep the snow, they travel freely from tree to tree gathering their food from the seeds of conifers or from the stores of cones cut off in autumn and put away where they can be found under the deep snow. Occasionally a track is seen where one has dropped with widespread feet upon the snow in the middle of an open space, either to burrow

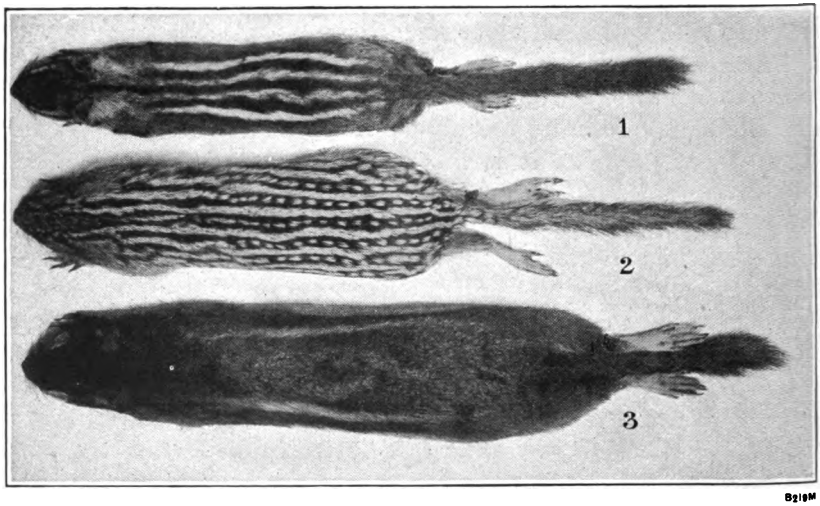

FIG. 6.—No. 1, Yellow-bellied chipmunk; No. 2, pale 13-lined ground squirrel; No. 3, mantled ground squirrel. Skins from study series in United States National Museum collection.

down to the ground and come out at some distant place or to lope over the surface of the snow to the nearest tree or stump or log, where food is to be found. They seem to be even more omnivorous than most squirrels, and besides eating a wide variety of seeds they are fond of almost any camp provisions, including biscuits, crackers, prunes, raisins, rolled oats, or scraps of bacon and other meat.

YELLOW-BELLIED CHIPMUNK: *Eutamias luteiventris* (Allen).—The yellow-bellied chipmunk is the middle sized of the three species inhabiting the Glacier Park, and while all have the many-striped back, this is the only one with the yellow extending across the belly in a way to give it its common name. Only when they sit up is this character shown, however, and as they scamper over the ground it is not always easy to tell one species from another.

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These are the abundant chipmunks around the hotels and camps and along the trails in the lower levels of both slopes of the park. Their principal range is along the lower edge of the timbered slopes, but in many places where the conditions are especially favorable it extends up on open slopes nearly to timberline. At Glacier Station they were common along the creek from the hotel well up the side of the mountain. A few were seen on Two Medicine Lake and at the lower end and along the north side of St. Mary Lake. They were common in the Swiftcurrent Valley, along Kennedy Creek, in the Belly River valley, and at the Waterton Lakes, where, in 1874, the type was collected by Dr. Elliot Coues; also on the west slope around Lake McDonald, at Belton, and in the North Fork Valley. They rarely climb trees and much prefer logs and stumps and brush patches, slide rock, or such cover as they can find about the camps and hotels. Their homes are underground, among rocks, or in hollow logs, and they rarely go far from their burrows or from retreats into which they can quickly escape their numerous enemies. At Many Glacier Hotel several were in the habit of coming for scattered crumbs to the kitchen door, and for oats to the place where horses were being fed. They had become so tame that they would take food from the hands of some of the employees with whom they became friendly, but occasionally were scared away by some one foolishly trying to catch them. It was a source of daily interest to watch them come for food and fill their cheek pouches until they bulged out on both sides, then rush away to a burrow under some rock, where the pockets were emptied into their winter storehouse. They were easily photographed at 4 or 6 feet from the camera, but their motions are so quick that usually only snapshots are possible.

As a chipmunk gathers the scattered oats around a feed box he shells each seed as it is held between his thumbs and in a twinkling tucks it into a pocket and goes after another. The pockets grow rapidly in size as the animal works, and often in a space of five minutes they will contain a good load for the granary. The chipmunks are strictly diurnal in habits, and though industrious do not observe union hours. They work from sunrise to sunset, with a long siesta at noontime. From midsummer until the snows cover their food plants they work with great energy, and the stores of seeds, grain, and nutlets which they lay away are evidently ample to carry them through the long cold winter. They do not become excessively fat in autumn and no one knows whether they really hibernate in their underground dens or whether they merely doze and sleep and eat in their warm nests under the deep snow. The first light snow does not drive them into their dens, but after it becomes deep and the weather is cold they are not seen, and remain hidden until the warm days of April begin to bring bare spots on the hillsides.

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The five or six young are born late in May or early in June. By the first of July they are out playing and learning the ways of chipmunk world, and by August they, too, are busy storing away winter supplies. Occasionally in their eager search for food they appropriate camp supplies not intended for them, but in most cases they are welcome visitors to camp, and their spritely ways and cheery chipper along the trails add one more bright and attractive phase to the animal life of the park.

FOREST CHIPMUNK: *Eutamias umbrinus felix* (Rhoads).—These large, bushy-tailed, white-bellied chipmunks are readily distinguished from the yellow-bellied by their slightly larger size and richer colors, in strong contrast to their pure white bellies. Mainly forest dwellers, they climb trees readily, and if frightened often go up a tree instead of down into the ground. Their voices also are sharper, more shrill, and birdlike, both in their slow *chip! chip! chip!* and in their rapid and sometimes frantic chipper of alarm. They are not abundant and are seen only occasionally, generally in the Canadian Zone forest of the middle slopes of the park. In 1895 specimens were collected along the south side of St. Mary Lake, and others were taken at Summit and Paola. In 1917 one was found living among the ruins of the old chalet at the lower end of Gunsight Lake, but even in this mass of ruins when alarmed it took refuge in a spruce tree near by. Forest chipmunks seem less friendly than the abundant little yellow-bellied species, but this is doubtless due to their scarcity and lack of frequently coming in touch with people. The four or five young are born in June, and the same cycle of breeding, storing food, and sleeping through the long winters is gone through each year.

LITTLE MOUNTAIN CHIPMUNK: *Eutamias oreocetes* Merriam.—This tiny chipmunk, pale-yellowish with pure white belly, is apparently common at timberline along the crest of the range throughout the park. The type specimen was collected in 1895, at 7,500 feet, on the high ridge, north of Summit Station on the Great Northern Railroad, and in 1917 two more were taken in Piegan Pass at 7,400 feet altitude, and others were seen in Gunsight Pass at 7,500 feet. All of those collected and others seen have been at or near the extreme upper limit of dwarf tree growth or on slopes several hundred feet above. They are usually found among the rocks, scampering over them like tiny nervous sprites, never still for a moment, flashing from one stone or little alpine plant to another, or dashing in and out among rocks or under prostrate branches of dwarfed trees. In Piegan Pass I followed one for some distance as it ran over the rocks, apparently with some distant object in view, until it came to a little creek that emerged from under a great snow bank. It quickly dis-

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appeared over the edge of the rocks down into the cavern, where the water was roaring, and, after getting a drink, flashed back and out over the great snow field; others were seen sitting on the tips of some sharp peaks of rock, flipping their slender tails and uttering a weak little *chip! chip! chip!* When startled in the trails where they were hunting for scattered grain they would rush away to the rocks with a fine rapid chipper that corresponded well with their diminutive size and sparklike motions. They were eagerly collecting seeds from some of the tiny alpine plants, and in Piegan Pass one taken for a specimen had filled its cheek pouches with crumbs of bread from the lunches of passing tourists. On August 3 the young of the year were nearly full grown and were as busy as their parents in search of seeds. In their high alpine world the summers are short, and for about nine months of each year they are buried deep under the snow. They do not become fat in autumn, and it is doubtful if they hibernate to the full extent that the ground squirrels do. Thus they have to work fast to obtain the large supply of seeds needed to carry them through the winter. As grains of oats scattered along the trails by the horses are eagerly sought by them, tourists may look for them wherever the trails cross the highest passes in the park.

MANTLED GROUND SQUIRREL: *Callospermophilus lateralis cinerascens* (Merriam).—Mantled ground squirrels are generally spoken of as large chipmunks, which they somewhat resemble in the heavy black and buffy side stripes, moderately bushy tails, and bright brown or grayish brown heads and shoulders, but they are more like the ground squirrels in having heavy bodies, rather short ears, and the burrowing habits of true ground squirrels. In structure they are somewhat intermediate between the two groups and are well placed in a genus by themselves.

While generally distributed over the whole Glacier Park region, they are usually not numerous. In 1895 a specimen was taken at Summit on the railroad, a few at St. Mary Lake, and others were seen on Flat Top Mountain north of the lake; and in 1917 they were found at Sun Camp on St. Mary Lake, in Gunsight Pass, Piegan Pass, at Many Glacier, and about Waterton Lake. They are generally seen about the hotels or camps where,coming for scattered grain and crumbs, they soon become very tame. At Many Glacier Hotel one was in the habit of coming daily to the kitchen door and to the place where saddle horses were hitched to the trees and occasionally fed oats, and he would take food from the hands of several of the employees who had cultivated his acquaintance. To the children especially, one of the interesting features of the day was to watch him filling his capacious cheek pouches with crumbs, peanuts, or grain, until they bulged out on both sides of his neck, before he scampered away to unload his stores into an underground chamber in

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the slope above the hotel. One came to a feed box below the hotel near the edge of the lake, and another could usually be found on the rocks near the chalet or along the canyon walls above the waterfall where the river leaves the lake. They also were so tame that their pictures could be taken at a distance of only 4 or 6 feet from the camera, and often in very pretty attitudes as they sat on the rocks or squatted on their heels shelling the oats before putting them in their cheek pouches. At the north end of Waterton Lake two were in the habit of coming to a place where horses had been fed on the ground, and on several occasions I was able to secure photographs. As I sat on the ground with the camera open they would feed all around me with very little sign of alarm, and one gave beautiful illustrations of muscular control of its tail. While sitting up watching me it would often spread the tail to full width by drawing the skin forward on each side until every hair stood out at right angles to the axis, giving the tail a width of about an inch and a half instead of the usual half inch. It would thus spread and then close the hairs slowly, just as a ruffed grouse often spreads and closes the tail as it struts through the woods. I could not be sure whether the motion was due to fear or surprise or a wish to puff itself up and frighten me or another intruder of its own species away, or whether it was merely a vain display of its beautiful plume. Fortunately one of my photographs showed this one's tail partially spread, its width strongly contrasted with that of another individual in the same snapshot. It soon became accustomed to my presence, and would pay no attention to me while busily filling its cheek pouches with oats which had been scattered on the ground by the horses. Its nose was run rapidly over the surface of the ground until an oat was discovered and quickly picked up in the teeth, and in about three motions as quick as a flash the hull was removed and the kernel tucked into a cheek pouch. Sometimes the grain was held in one hand and grasped between the fingers and the palm as the animal sat up on its heels, but generally it was held between the two thumbs to be shelled. The squirrels work so rapidly that in a few minutes the cheek pouches begin to bulge, and in 10 or 15 minutes are puffed out like a bad case of mumps, and then the animals run away and a little later return with pockets empty. In Gunsight and Piegan Passes they were seen on the rocks near extreme timberline, where they were gathering seeds from the little wild plants and gleaning a few scattered oats along the horse trails. They are generally found near rocks, old logs, or other secure cover under which they burrow and make their winter homes. They rarely climb trees, although in emergency they can climb to escape from danger. They are quiet little animals, not so quick and nervous as the chipmunks and generally silent. On rare

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FIG. 1.—MANTLED GROUND SQUIRREL IN CHARACTERISTIC UPRIGHT POSITION OF WATCHFUL ALARM, WATERTON LAKE.

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FIG. 2.—MANTLED GROUND SQUIRRELS FEEDING ON SCATTERED OATS AT OLD CAMP ON WATERTON LAKE, THE ONE IN FOREGROUND WITH SPREAD TAIL.

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FIG. 1.—SIDE-HILL BURROW AND MOUND OF EARTH THROWN OUT BY COLUMBIA GROUND SQUIRREL NEAR PIEGAN PASS.

The burrow excavated and mapped is shown in text figure 7.

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FIG. 2.—COLUMBIA GROUND SQUIRREL AND BURROW AT McDERMOTT LAKE, JULY, 1917.

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occasions one may be heard to make a long shrill squeak or whistling note, but this is so rare that few people ever notice it.

The five or six young are born in May or June and by August are well grown and caring for themselves. Like the ground squirrels and unlike the chipmunks, they become extremely fat during the summer, and before the cold weather begins they enter their warm underground nests, where apparently they hibernate for the long winter period, or from September to April. Just when the winter's stores of seeds and grain are eaten is not definitely known, but they are probably intended to tide the sleepers over the beginning and end of their hibernation period, when food is scarce or they are too sleepy to go after it.

COLUMBIA GROUND SQUIRREL: *Citellus columbianus* (Ord).—Columbia ground squirrels, or, as often called, picket pins, and, incorrectly, gophers, are in many places in the park the most abundant and conspicuous mammals to be found. They are among the largest of the ground squirrels. An unusually large old male at Many Glacier weighed 1½ pounds, and while not fat, was nearly twice as heavy as some of the others taken at the same place. They have short legs, short bushy tails, and short ears, and in every respect are adapted to their mode of life on the surface and under the ground. Even their coarsely mottled gray coats, with the reddish-brown nose and throat, lowerparts, and hams, are protectively imitative of the colors of the ground.

They occupy practically all of the open country along the lower borders of the park and throughout the Hudsonian Zone, but do not enter the heavily timbered areas. At Glacier Station they were common along the creek valleys, and in Swiftcurrent Valley they are abundant from the Sherburne Lakes west to McDermott Lake, and thence almost continuously through the open slopes and burnt strips up to Iceberg Lake and Swiftcurrent Pass. None were seen in the Kennedy or Belly River valleys, but in the Waterton Lake valley they are abundant, and also in the high country around Boundary Peak, over Kootenai Pass, on Flat Top Mountain, at Granite Park, Piegan Pass, Gunsight Lake and Pass, and around the Blackfeet Glacier. On the west slope I found old burrows on the western arm of Stanton Mountain, and collected specimens on the high ridge just south of Nyack near the southern line of the park. In the North Fork Valley they were common from Camas Creek to Big Prairie, on April 15, 1918, but were not yet out on Round Prairie. The open slopes and little parks and meadows of the Hudsonian Zone are their favorite range in this region, and here they become very numerous and are generally conspicuous and noisy in the open spaces along the trails. Sometimes a dozen or more may be seen running

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through the grass and flowers ahead of a party of tourists, and their loud chirping notes may be heard up and down the slopes for a long distance as they rush for their burrows and then stand erect watching for danger and passing along the alarm call. They are not usually found actually above timberline, but in many places are common among the dwarfed trees only a little below, and on open slopes or in the path of avalanches or fire-swept strips they range clear through the Canadian Zone to the open areas lower down.

Columbia ground squirrels are strictly ground dwellers, never climbing trees but often seen on logs and rocks, where they sit to watch for danger. Their burrows enter the sidehills or the flat ground wherever there is sufficient soil to give room for comfortable winter quarters. About the hotels and chalets they often live under the buildings and sit on the porches when no one is around. They gather at camp sites to pick up scraps of scattered food, and sit on the abandoned benches and tables, in places becoming very tame and confidential. Generally, however, they are wary and suspicious, for their enemies are more numerous than their friends. They are rarely found far from their burrows, and when alarmed all rush to the nearest burrow or shelter, no matter to whom it belongs. Their little roadways lead through the grass from one burrow to another and radiate out from the central dens into the meadows where they feed. Their call notes render them conspicuous where they would not otherwise be noticed. The first one that discovers an approaching enemy or suspicious character gives a loud *churp!* which is quickly taken up by others within hearing, and soon the word has been passed along far and wide. As one walks through their meadows these notes are heard on all sides. At first the note is a loud *churp! churp! churp!* at intervals of two or three seconds, repeated by each of the animals, but as the danger approaches the warning becomes more vigorous and rapid until with a final shriek of blended *churps* the nearest animal disappears down its burrow and others beyond double their energy in giving the alarm. The notes vary under different conditions. When a sharp-shinned hawk came swooping over an alpine meadow the notes were especially soft and did not seem to indicate much alarm. At another time when a large hawk was circling overhead their notes were shrill and almost frantic. Different tones and inflections evidently convey to them different meanings, but to what extent they use vocal communication is unknown. A quick sharp note of the mother squirrel sends the brood of young scampering down the burrow, while her softer tones only induce them to seek the edge of the burrow where they may await further instructions.

Their food consists largely of a great variety of green vegetation—leaves and buds and flowers and seeds of the mountain plants. The

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contents of their stomachs usually show a finely masticated mass of green pulp, in which fibers of roots, bulbs, and plant stems may be detected among the streaks and spots of bright-colored flower and berry stains, some particles of seed capsules, and occasionally bits of grasshoppers and other insect or animal remains. Their stomachs are large and, except early in the morning, seem always to be filled to their utmost capacity. The tender, starchy bulbs of the great dogtooth violet are one of their favorite foods and often the mountain sides are thickly pitted with little cavities from which the squirrels have extracted them. Camas and onions and other small bulbs also are dug and eaten and the seed-laden heads of grasses are a favorite autumn food. Toward the close of the season the squirrels find more ripening seeds and these form a greater share of their food than earlier. Consequently at this season they are taking on the necessary winter's fat more rapidly and their appetites and capacity seem to know no bounds.

Usually four to six young are born early in May in the warm grassy nests underground, and early in June these are beginning to appear outside the burrows, where they play about in interesting little family groups. A month later they are half-grown, getting their own food from the green plants, flowers, berries, and insects, and are growing rapidly. By the first of September they are nearly full-grown, and even the young have accumulated a considerable quantity of fat inside their skins for winter fuel.

The old males are the first to become very fat and hibernate, and, strange to say, those at the lower levels hibernate considerably earlier than those high up in the mountains, apparently because they have had more time to accumulate their store of fat. The old females are next to disappear, and last of all the later broods of young which were still busily gathering food near timberline up to August 24, long after most of the animals had disappeared from the surface in the low valleys. In their big warm nests deep underground they sleep through the long winter, apparently without waking, as no food is stored for winter use and they must depend entirely on their supply of fat. Early in April they begin to reappear in the lower part of their range, but it is probable that they are considerably later in emerging from hibernation at the upper levels, which at that time are still deeply buried in snow.

Their winter dens are well made and the best of them are used year after year. On July 27, at 7,000 feet altitude near Piegan Pass, I selected one of the numerous large mounds over the mountain side for a careful study of the den. A little fresh earth was being added to the mound each day. A trap set at the entrance caught a moderately fat old female that was evidently preparing her winter quarters. The mound at the entrance of the burrow contained about 4

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bushels of earth and stones brought from the burrow, and the lower part was packed and hard as though an accumulation of several years. There were two other openings farther back from which no earth had been thrown and evidently they had been tunneled to the surface from below. The main shaft of the burrow was usually 3 or 4 inches in diameter, and back a couple of feet from the entrance, just before the burrow forked into two main shafts, was a roomy chamber where the squirrels could turn around and sit up comfortably, a sort of reception room. Near secondary forks were also two other chambers which may have served several purposes, such as convenience in storing earth brought out of the tunnels, or places of retreat from which to watch for enemies that might enter the burrow from either direction. Well back about 8 feet from the entrance and a foot below the surface of the ground was a large nest chamber about a foot in diameter nearly filled with old soft nest material. The nest was composed almost entirely of the soft flat leaves of the brown "glacier grass" (*Juncoides parviflorum*) which abundantly covers the mountain slopes. At the bottom it was damp and moldy, but from the bed in the center to the top it was dry and clean, and a few fresh, green blades had been brought in for food or nest material. It had evidently served as winter quarters for the old squirrel and as a nest for her young and was being prepared for the coming winter. From one side of the nest chamber the burrow led down to an older and deeper chamber of some previous year, containing at the bottom an old rotten nest half full of excrement. A tunnel ran from it back toward the main entrance and into the main tunnel near the middle, making an easy way of escape if an enemy should dig to the first nest. Back of the nest a small shaft led to the surface of the ground and another opened out at the end of the first main fork of the tunnel. These rear openings were half concealed in the grass and evidently were for use as avenues of escape in case the burrow should be entered by a weasel or dug out by bear or badger.

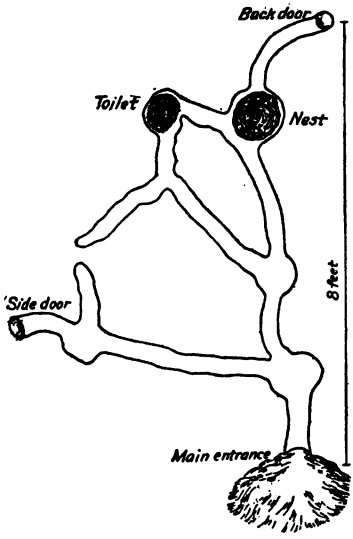

FIG. 7.—Plan of underground den of Columbia ground squirrel as excavated and mapped near Piegan Pass, July 27, 1917.

Many places were found where bears had dug for the squirrels, tearing up great tough sods of bear grass and even small trees and large stones in their efforts to get at the nest. In many cases they

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had evidently been successful in making a meal of a nice fat ground squirrel, as the nest had been pulled out and apparently no avenue of escape had been provided. Probably the bears are more successful in this kind of hunting after the squirrels have gone into their winter dens and become torpid, as most of the digging seemed to have been done late in fall.

The edible qualities of these squirrels have been discovered not alone by bears, as badgers, coyotes, foxes, cats, and hawks are fond of them. Some which I had collected for specimens and broiled on sticks over the coals of the camp fire were pronounced delicious by every member of the party. The young of the year are certainly as good as any young tree squirrel, and some of the party pronounced them better than young rabbit or chicken. In places where the squirrels have become so numerous as to be troublesome about camps or injurious to the meadows, it would not be difficult to control their abundance by allowing the campers to snare enough of them for their supply of camp meat. Any boy with a piece of string and a little patience would be able to provide a good mess of squirrels in a morning's hunt.

RICHARDSON GROUND SQUIRREL: *Citellus richardsoni* (Sabine).—The common flickertails of the Plains are small, plain yellowish ground squirrels, like miniature prairie-dogs. They are Plains animals, reaching into the eastern edge of Glacier Park only on the tongues of open ground. The only place where they are actually common within the boundaries of the park is at the lower end of St. Mary Lake, but they have been reported above the Sherburne Lakes in the Swiftcurrent Valley, and they come close to the park line in the Cut Bank, the Belly River, and Waterton Valleys. Along the stage road from Glacier to St. Mary they are in places abundant and conspicuous over the prairies, as also they are from St. Mary around to the Swiftcurrent Valley, so that a trip through the park implies a rather close acquaintance with these little squirrels.

They are strictly prairie dwellers, living in the open and depending on keen sight and hearing for protection from their numerous enemies, and on their skill in disappearing underground in case of danger. From the road their sharp whistle is frequently heard, and at a little distance they may be seen standing straight up in the grass like picket pins, which they are often called, but on nearer approach they quickly drop to the ground and disappear as by magic. In places the low mounds of earth at their burrows dot the valleys and their runways form a network through the short grass.

On bright summer mornings they are especially busy gathering food from the leaves, stems, seeds, and roots of numerous prairie

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plants, or chasing grasshoppers and crickets, which form an important part of their summer food. Farther out among the wheat fields they gather from far and near and lay a heavy tribute on the harvest of grain, but in the park they do little damage and are an ever-present source of interest.

The young are born early in May, and before the end of the month they are out gathering food and playing about the burrows in family parties usually of four to six. By the first of September the young are nearly full grown and have accumulated a sufficient stock of fat to carry them through the winter. With the first cold weather all disappear in their underground nests, where they sleep soundly until the warm days of early spring return. The nest burrows are usually simple and not very extensive, so that badgers dig out great numbers of the squirrels all through the summer, and even after they have hibernated, until the ground becomes well frozen.

STRIPED GROUND SQUIRREL: *Citellus tridecemlineatus pallidus* (Allen).—The pale, western form of the 13-lined ground squirrel may usually be recognized by the parallel lines of dark brown on a ground color of buff over the upperparts. They are slender, almost weasel-like, animals, with short ears and slightly bushy tails. So protectively colored are they that in the prairie grass they are rarely seen, but their shrill bubbling trill is often heard along the roadsides.

These squirrels also are prairie dwellers and come into the Glacier Park only in a few open spots along the eastern border. In 1895 a few were found at the lower end of St. Mary Lake, and others along the railroad at the southern edge of the park in open spaces nearly to the summit of the range. They were reported in the Swiftcurrent Valley between Sherburne and McDermott Lakes, and conditions are favorable for them in the Belly River valley well into the park.

In habits they are shy and secretive, keeping much under the cover of the prairie grasses and low vegetation, and even the doorways of their burrows are often well hidden.

Their food consists largely of seeds, with some green vegetation, and usually a larger proportion of insects than with most ground squirrels. Their regular cycle of habits—hibernating through the long winter, breeding early in spring, caring for the young, and storing up a winter's supply of fat—is similar to that of many other species. In places where they are numerous they do much damage in the grain fields, but here on the western border of their range they are so scarce and inconspicuous that they are not even much of a feature of interest, except to the field naturalist, who is always looking for the rarer kinds of animal life.

GLACIER HOARY MARMOT: *Marmota caligata nivaria* Howell.—The great gray mountain marmots are about twice the size of the

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FIG. 1.—RICHARDSON GROUND SQUIRREL.

Photo. by E. R. Warren.

FIG. 2.—PALE THIRTEEN-LINED GROUND SQUIRREL.

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ordinary woodchuck and vary in color from a yellowish brown in midsummer to a light gray winter coat in fall and spring. The head, feet, and tail are always dark, but a white band around the nose in front of the eyes is usually a conspicuous mark, even at a distance.

They live mainly in the Hudsonian Zone, but often range over the open slopes of the Arctic-Alpine above the extreme limits of timberline. Apparently they fill the whole Hudsonian Zone area of the Glacier Park region and may be seen on every high pass over which trails lead. They are common at Cracker and Iceberg Lakes, over Gunsight, Piegan, Swiftcurrent, and Kootenai Passes, and on the ridge at the head of Kintla Lake. They extend also north through the Canadian Rockies and south to the Bitterroot and Sawtooth Mountains of Idaho, while closely related forms are found in Alaska and the northern Cascades.

In habits they are burrowers in open country where they depend largely on rocks for the protection of their dens and on rock towers or ledges for lookouts from which to watch for numerous enemies. As some of them seem always to be on guard, a long, evenly sustained and piercing whistle usually greets the tourist before the whistler is visible. The alarm note is generally taken up and repeated along the mountainside, while every little and big whistler that is out feeding lopes for the meadows or snow banks or the nearest rock pile, where it can also gain a wide view. Having short legs and heavy bodies, their only protection from numerous enemies is constant vigilance and close proximity to sheltering crevices and caverns among the rocks, where, to escape bears, coyotes, or golden eagles, they can quickly take refuge. They are occasionally seen crossing the great snow fields or the glaciers from one point of rocks to another, and on the pass at the head of Kintla Lake one old fellow had a well-worn trail from his fortress on the rock cliff across a wide bare slope to the only patch of green willow-carpeted turf within reach. Occasionally a big burrow is found on the sidehill in the open, but generally they are located under the edge of some great bowlder or go into the ground underneath a heap of broken rocks at the base of some cliff, or back in a crevice between rock walls that will admit no larger animal. In these rocky fortresses the animals are comparatively safe, but in the open the bears occasionally dig out their dens and feast upon the occupants. Marmots are good climbers and are often seen high on the face of cliffs where they could go only by the help of their strong curved toenails. After a hearty meal they spend much time sunning themselves on the cliffs and rock pinnacles where they have a wide view over the country and can absorb the rare warmth of the sun's rays in these high altitudes.

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Their food consists mainly of green vegetation, and they are often seen grazing in the meadows, picking the various little plants and eating them, stems, leaves, flowers, seeds, and all. I have not been able to determine the species eaten, but their large stomachs usually contain a well-masticated mass of green herbage with traces of flowers, seeds, and stems. One old fellow in Kootenai Pass, when suddenly alarmed while feeding, rushed to the top of a big bowlder with his mouth still full of green leaves which he slowly chewed while watching me.

Along the trails over the high passes marmots gather to pick up the scattered oats left by the horses, and are often so eager for this unusual feast that they would let me take snapshots at 15 or 20 feet before they would leave the trails. The constant passing of tourists, pack trains, and saddle horses is teaching them confidence in these strange new denizens of the park, and evidently with a little care and feeding they could be coaxed into tameness.

The young are born apparently about the first of June, as a female collected May 27, 1895, contained five well-grown embryos. At the same time several specimens of half-grown young of the previous year were collected, which shows that the young do not fully mature the first year, but apparently reach maturity and a breeding age by the second spring. On August 1, 1917, in Gunsight Pass a family of four young about the size of ground squirrels were photographed among the rocks by the side of the trail while their mother whistled loudly from a ledge above our heads. On August 4 two young about quarter grown were seen in Piegan Pass, and in Kootenai Pass on August 22 several small young were seen among the rocks. In every case the mother was near and was very solicitous for their safety. Whether these small young are able to lay in sufficient food to carry them through the winter's hibernation or whether they are nursed by the mother up to the time of hibernation has not been determined, but that they come through the winter in good condition is indicated by the half-grown specimens collected in May.

Like all hibernating mammals, marmots have large stomachs and good digestion and assimilation. After the breeding season is over they take on fat rapidly, and by the beginning of cold weather the adults at least have laid in a large quantity of oily fat under their skins, and even the inner body cavities have become loaded with fat. Up to August 24, when for the last time I crossed Swiftcurrent Pass, marmots were still active and their loud whistles were heard across the timberline slopes. A cold wave and snowstorm a few days later may have driven them into their winter dens, but in the short season of these high altitudes they probably remain active as long as the warm days and green food last. At best they must be buried under the

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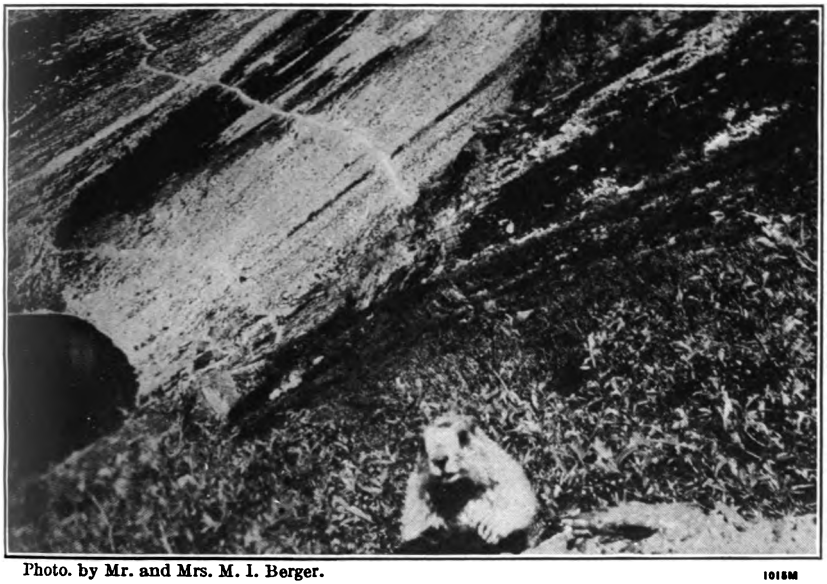

Photo. by Mr. and Mrs. M. I. Berger. 1015M

FIG. 1.—HOARY MARMOT NEAR THE HORSE TRAIL AT THE END OF LAKE ELLEN WILSON JUST WEST OF GUNSIGHT PASS.

Photo. by Mr. and Mrs. M. I. Berger. 1017M

FIG. 2.—HOARY MARMOT NEAR THE TRAIL OVER GUNSIGHT PASS.

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B17557

FIG. 1.—BUSHY-TAILED WOODRAT AT ENTRANCE TO ITS HOME IN A CAVE NEAR SWIFTCURRENT FALLS.

B17558

FIG. 2.—THE SAME WOODRAT AND CAVE, SHOWING MORE OF THE BUILDING MATERIAL PILED UP TO CLOSE THE ENTRANCE OF THE CAVE.

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deep snow for seven or eight months, and as they do not lay up any stores, the accumulated fat must carry them through this inactive period. Dry grass and sedges are carried into their burrows for nest material, and we can imagine them comfortably curled up in their warm beds deep under the cover of ground and rocks and snow; but except for a few burrows excavated by bears, I have never been able to explore their dens.

BROWN WOODCHUCK: *Marmota monax petrensis* Howell.—The brown woodchuck, which is found a little farther north and west, undoubtedly does occur in some of the lower areas of the park, but I could not get any definite record of its occurrence. Park Ranger Gibb thinks he has seen them within the park boundaries, but could not give me a specific locality record. Apparently none of the other rangers had seen or recognized the species.

Family MURIDÆ: Mice, Rats, etc.

GRAY BUSHY-TAILED WOODRAT: *Neotoma cinerea cinerea* (Ord).—These bushy-tailed woodrats, pack rats, trade rats, or cliff rats, as variously called, are not closely related to the common barn rat, or wharf rat, which is justly held in such ill repute. They belong to a different subfamily and are natives of America, while the wharf rat is an introduced pest of Asiatic origin. Far from having the disgusting habits and mean appearance of the wharf rat, woodrats are bright, attractive animals with big eyes, expressive faces, and squirrel-like tails, and no animal could be more neat and exemplary.

They are common wherever rocks and cliffs or any suitable cover provides them with homes throughout the lower levels of the park. Their greatest abundance is in the Transition Zone borders of the park, and usually they do not extend far into the Canadian Zone nor at all above it. They are not strictly confined to any zone, however, as their selection of homes protects them from the severity of climate and enables them to adapt themselves to a wide range of environment. A broken cliff or deep talus on a steep south slope will sometimes carry them well up the mountain side without exposure to the extreme cold of the higher zone. and occasionally their signs are found almost up to timberline.

Woodrats are the original cliff dwellers, having made their homes among the rocks for so many ages that some of their deposits have become almost geological in formation. Their safest strongholds are found in caves and crevices in the rocks and they have adapted their building methods and manner of life to these cliff dwellings. A typical family residence was found in the wall of the canyon over Swiftcurrent Falls near Many Glacier Hotel. The overhanging cliff shelters a small cave which opens back in narrow cracks and

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crevices into the limestone ledge. Here the rats have piled up bushels of sticks and chips, bark, and stones in the mouth of the cave, closing up many of the narrow places to keep out their enemies and to form a front door barricade for the protection of their nests and living rooms behind. The ledges and rock shelves are worn smooth by their little feet which for ages have been running back and forth from one opening to another or away to the berry bushes and patches of weed seeds and pine cones beyond the edge of the cliff. Their runways and nest chambers are clean and neat, and they use some out of the way corner of the rocks in which to deposit their little black pellets. All food refuse is used for building material, and their system of home economy is practical and efficient.

As they are strictly nocturnal, it is difficult to study their habits or obtain photographs of them at home. To obviate this difficulty as far as possible I placed an inverted box by the side of their house, bent and lashed a twig into an oval loop and, placing the rounded end under the edge of the box and a bit of bread and bacon on the sharp end of the stick under the middle of the box, left it over night. In the morning, as I expected, the loop had slipped out and the box had fallen and underneath was Madam Woodrat sitting in a dark corner awaiting further developments. I slipped a gunny sack under and over the box, including its occupant, and then, removing the box, carried the woodrat to my back porch at the hotel and placed her in a screen-covered box. She seemed greatly surprised, but not much alarmed, at all of this unusual procedure, and when I placed a bunch of green plants of various kinds in the box she at once seized upon them and began to enjoy her much-delayed breakfast. She would stop eating and fix her big shiny eyes upon me as I came near the box, and with erect ears and long, vibrating mustaches she made a most animated and interesting picture. If I approached closely she would sit straight up on her hind feet with her little fists rounded in a most pugilistic attitude, and once as I tried to pass her a more dainty plant to eat she jumped at my hand and gave me a vigorous nip with her teeth. Again as I tried to put a bag over her to transfer her to better quarters she caught me by the finger and bit a hole through the end of it. I left the bag in her box while bandaging my finger and when I returned she had crawled into the bottom of the bag, just where I wanted her for a transfer to a glass jar, where she could be more conveniently studied.

When alone in her box she would often make a thumping or drumming sound, and by approaching carefully I could watch her raise her hind feet and strike the soles down flat on the bottom of the box, both together, with a sound such as one makes by striking the flat of the finger on a table. These taps were repeated rapidly or slowly at varying intervals of from several to a second to only one or two,

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and were given in varying numbers that reminded me of a telegraphic code of signals. This was not due to her imprisonment, as I have previously heard and watched woodrats make these signals in camps and cabins and among the rocks. The object is evidently to call or attract the attention of other individuals, to give some warning, or to convey such meaning from one to another as may be of service to them. While not given in the dots and dashes of the International Morse Code, there is sufficient variation in the tapping to convey considerable expression of feeling if not of definite ideas. The tail was never moved during the thumping and was usually coiled along the side or lying quietly at rest.

Bread, toast, blueberry roll, crackers, and oatmeal in plenty were put in the box with her, but she seemed not to care much for any of them. When I put in a bunch of green plants she at once began to eat the leaves of the fireweed, thimbleberry, *Spiræa*, and other plants, and the next morning had finished most of the leaves, although she had scarcely touched the bread and grain. She was active all night and kept me awake by gnawing her box, thumping with her feet, and trying to find a way out of her well-screened cage. One morning, putting her in a bag, I took her back to her house in the cave, and after looping a soft, green fishline over one foot let her sit on her old doorstep for a picture. She posed well in many positions and with many expressions before I let her go back to her children in the old and well built cliff dwelling that she may have inherited from a thousand generations of ancestors. She could certainly never have been happy away from this familiar cliff above the roar and spray of the falls, where every shelf, nook, and corner were familiar to her, where the trails led around to a brush-covered rock pile, where thimbleberries, serviceberries, chokecherries, and numerous seeds and bulbs could be found to go with her fare of green leaves and flowers, and where a power house not far away and neighboring chalets and outbuildings afforded some choice scraps of food and interesting ground for exploration.

In winter some of the more adventuresome individuals of this woodrat colony visit the storehouses and even take up their abode in them. A teamster who slept at night in the winter storehouse at the end of the bridge told me that one morning he missed his watch and was sure a woodrat had taken it, because a piece of leather showing the print of sharp teeth was left where the watch had been lying on the floor by the side of his bed. A careful search under the floor of the building finally disclosed the watch with other accumulations of building material where a woodrat had established its residence. As woodrats are inveterate builders, always gathering building material of a size convenient for carrying, the habit of dropping whatever they are carrying and taking any other object

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that seems better suited to their purpose has given them the name of "trade rat." Many stories are told of their exchanging sticks for pipes, jackknives, or other articles that they may prefer but that do not always satisfy the other party to the trade. The same collecting habit has also given them the name of "pack rat" and perhaps also of woodrat, for a large part of their building material is of sticks, chips, and bark, and many of their houses have a very woody appearance.

To one familiar with their habits their presence in a cliff or rock slide can usually be detected even at a distance by the white streaks on the points and edges of the cliffs near the dens. These have sometimes caused geologists much perplexity, but they are merely the age-long accumulations of calcareous matter from the urine of the woodrats. In some places the cliffs are heavily streaked with white, as though the little pinnacles were touched up with a paint brush, and often the white stony crust is 2 or 3 millimeters thick.

B18502

FIG. 8.—Woodrat in his nest of moss and lichens in a cabin at the mouth of Quartz Creek. He had been killed by some passer-by and left on the floor, and was put in his own nest and photographed in as natural a pose as possible, but without the animated expression of life.

While devoted to their homes, some of the woodrats are evidently possessed with a desire to wander, for occasionally one will appear in some camp or cabin far from the rocks, and invariably take up his abode. Even the ranger cabins, which are occupied a part of the time by their rightful owners, are often also occupied by the woodrats. At the cabin on the west side of Waterton Lake the animals had built nests and stick piles in the storage room but evidently had been caught or driven away by the ranger. In another abandoned cabin at the upper end of Waterton Lake they had two beautiful nests of chewed-up tow from a gunny sack, one on the floor in the corner and the other on an old bed. The door had been left open about 4 inches, where it stuck tight, and in order to close it as much as possible they had piled sticks and chips in the opening. On the old bunk in the corner of the cabin a bushel or more of green leaves and stems of plants had been piled up and had become dry and green like good fresh hay. Among them I recognized thimbleberry, mountain ash, meadow rue, *Actaea*, and other familiar plants which grew about the cabin. The open spaces between the double roofs of

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the cabin also were stuffed full of similar weed-hay for winter use. In many places the accumulation of winter hay is almost as extensive as that provided by conies, and in one place near Granite Park I found where the woodrats and conies had evidently been using the same stack of hay through the winter. At Lake McDonald, where there are many summer cabins, the woodrats often take possession of those unoccupied during the winter and hold high revelry until the owners return. In one cabin on the edge of the lake were bushels of leaves and branches brought in for winter food and a pile of chips and sticks in the open doorway between the two rooms suggested an attempt to barricade the smaller room, of which they had taken possession. On a high shelf in the corner a large bowl-like nest had been built of the soft brown fibers of cedar bark, moss, and lichens, and well lined with bits of cotton from the inside of an old cotton comforter which had been left in the cabin. The nest was as well built as those of many birds, and somewhat in the form of the robin's nest, only a little larger and of much softer material. It was just large enough for one good-sized occupant to lie curled up below its rim, and I know of no prettier animal picture than that presented by the big ears and bright eyes of a woodrat peering over the top of one of these nests.

B18506

FIG. 9.—Woodrat nest, lined with cotton out of old quilt, on shelf in corner of cabin at Lake McDonald. April 21, 1918.

In some cases poisoned grain or a few rat traps are left in a cabin that is to be unoccupied during the winter to prevent any possible mischief from the woodrats, but generally bedding, food, and such things as they are likely to misappropriate are suspended from the ceiling by wires or kept in tin-lined cupboards or boxes. If a gunny sack is left for them to build a nest of, and a box with a hole in it for them to use as the foundation for their building operations, they are not likely to do much damage.

They have a slight musky odor which seems to come from a large gland in the skin of the belly, but when properly dressed and cooked

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the flesh is as delicate and delicious as that of quail or any other game animal, and the woodsman who knows the habits of wild animals can usually carry a trap in his pocket and live comfortably on woodrats and other small game, including ground squirrels and pocket gophers.

FOREST WHITE-FOOTED MOUSE: *Peromyscus maniculatus artemisiæ* (Rhoads).—These little white-footed or woods mice may be known by their large thin ears, long slender tails, pure white feet and lowerparts, and buffy-gray or bluish-gray upperparts. While tiny animals themselves, they are slightly larger than the Plains species (*P. m. osgoodi*), and have relatively larger ears and longer tails. An adult female from McDermott Lake measured, in millimeters: Total length, 191; tail, 95; hind foot, 22.

These are probably the most abundant mammals of Glacier Park, although they are rarely seen and their presence is often unknown. They occupy the whole timbered area of the park from the valley bottoms up to timberline and in some cases even above, among the rocks of the open slopes. Few animals have the ability to adapt themselves to a wider range of climate and general environment. Through the woods they live in hollow trees or logs, among the broken rocks at the base of cliffs, in the little caves and caverns of the cliffs, or in underground burrows which they make for themselves or appropriate from other animals. An abandoned pocket-gopher burrow will often provide homes for a dozen of them, while vacant dens of ground squirrels, chipmunks, or other mice are appropriated, and even camps, cabins, chalets, and hotels are taken possession of in a way that is sometimes only amusing, but at others annoying. All they ask is a safe and well-sheltered corner or cavity for their nest and family, soft material from which to make their nests, and plenty of almost any kind of food. In helping themselves to these necessities they sometimes infringe upon the property rights of others and fall into more or less disfavor. Generally, however, their presence in the park is not seriously detrimental and they furnish much interest and amusement, especially in buildings to which they come at night to scamper about the floors in search of stray crumbs and scattered bits of food.

They are strictly nocturnal in habits and do not become active until about the time the lights are turned on. Artificial light seems not to trouble them, however, and they often go scampering through camp and occasionally may be seen playing about the corners of the main hotel corridors or running from one place of concealment to another over the floors, much to the amusement of the guests, and especially of the children. I caught a number of them in my hands and kept some in captivity for several days to study their habits more closely. Generally they were nervous and timid when cap-

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tured, but they soon became quiet and gentle. They would sometimes try to nip my fingers, but when proper care was taken they would let me take them in my hands, and would make little effort to escape.

They are prolific breeders, and the four to eight young in a litter are brought forth in the warm soft nests in dry and secluded cavities underground, among rocks, hollow trees or logs, in boxes or crevices, or in corners of buildings. They quickly mature and are soon running about in the blue-gray coats which are worn through most of the first year. Several litters are raised each season, and the increase is so rapid that any safe retreat like a vacant building is soon overrun by them. Outdoors the little owls, weasels, coyotes, and foxes pick them up so rapidly that their abundance is well checked, and when the breeding season is over their numbers steadily decrease until the next spring.

They do not hibernate or become noticeably fat, but during the autumn they store up considerable quantities of seeds, grain, and nutlets for winter use. Buried under the deep snows of winter they live safely and in comparative comfort and luxury next to the ground in the tunnels which they make under the snow. They also come to the surface and run over the soft snow, and lines of delicate tracks may be traced in winter from one log to another, from tree to tree, or from rock pile to cliff, and thus some clue to their winter habits is obtained. They climb trees readily and often occupy hollow trunks or even old woodpecker holes in stumps and trees.

Mountain Lemming Mouse: *Phenacomys orophilus* Merriam.—These rare little lemming mice somewhat resemble the meadow mice, but differ radically from them in having molar teeth with well-developed roots and different type of enamel pattern. In external characters they may be distinguished by their small size, light gray color, and by the tail, which is slender and does not noticeably taper. An adult male collected on the Swiftcurrent River below McDermott Lake measured, in millimeters: Total length, 122; tail, 30; hind foot, 18. Their measurements serve to distinguish them from almost any of the other little rodents except the red-backed mouse, from which they differ strikingly in color.

In the spring of 1895 Howell and I collected a dozen specimens of these little mice at St. Mary Lake, one at Midvale, and one at Summit; in August, 1917, I caught one in the open valley just below McDermott Lake; and in April, 1918, I found one dead in the trail near Kintla Lake. These records would indicate that lemming mice are unusually common in the Glacier Park region, and may be found anywhere along the lower slopes of the park or in the open Hudsonian Zone area near timberline. Most of the specimens

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taken were from lower altitudes, but usually the zonal range of the species is considered more Hudsonian than Canadian. They are mountain dwellers of wide distribution over the Rocky Mountain region from northern New Mexico to British Columbia, but over much of this area they are so scattered and so rarely found that they are generally considered rare.

In habits as well as appearance they are obscure and inconspicuous. They live in burrows in the grassy parks and make tiny runways under the fallen gray grass from one burrow to another and out to their feeding grounds, but so well concealed are both their burrows and their runways that the animals would rarely be seen, even if they were not largely nocturnal. The field collector with a line of mouse traps in all kinds of situations occasionally gets one by accident and discovers where they are living, and then by continued trapping in the vicinity can usually secure other specimens. In the grassy openings along the south side of St. Mary Lake they were found in unusual numbers. By parting the old fallen grass their runways and burrows could be detected over the surface of the ground, and a little clue to their habits was obtained from the specimens collected, the nature of their homes and the varieties of plants which they had cut for food. The fragments of grass and other green plants were found along the runways and in places had been drawn into the burrows to be eaten at leisure. The stomachs of the mice collected contained mainly green vegetation. The burrows and runways were more or less grouped, indicating colonies or family residences. The nests and homes appear to be entirely underground, and the females taken for specimens in May and June usually contained four to six embryos. Later in the season young of all ages are found, and it is probable that several litters are raised during the summer.

RED-BACKED MOUSE: *Evotomys gapperi galei* Merriam.—These little furry, short-tailed, short-eared, red-backed mice may always be recognized by their bright hazel or chestnut-brown backs and buffy gray sides and lowerparts. They live mainly in the woods and are common throughout the timbered area of the park. Specimens have been collected at St. Mary Lake, McDermott Lake, Waterton Lake valley, Piegan Pass, Summit Station, and Java. They are generally found under old logs in the woods, but also where there is any protecting cover—as creek banks, loose rocks, brush, or dense growth of vegetation. They burrow in the mellow ground or run in natural cavities where they have their nests and homes and from which they forage out over their feeding grounds. In places where they are common little runways are found, but in general the animals are more on the open ground where they scamper from place to place without the neces-

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sity of roads. They clamber over logs and even climb trees, but generally keep under cover as much as possible to avoid their enemies. While mainly nocturnal they are often caught in traps in the woods during the daytime and especially toward evening, when they seem to be most active. Their food consists chiefly of green grass and a great variety of small plants and seeds. Their stomachs usually contain a combination of green-plant tissue and the white starchy part of seeds, but they are always eager for rolled oats or any kind of grain that is offered as trap bait. They seem, however, not to be inquisitive and rarely get into camp supplies or do any mischief except where provisions are left on the ground unprotected. In fact, their presence is rarely discovered by the camper or even by the experienced woodsman and fur trapper who spend much time in their habitat. A few traps, set in proper locations, will soon reveal the presence of the mice, and a tin can at the bottom of a hole in the ground will often be found occupied by some that have tumbled in during the night.

Four to six embryos in females taken for specimens indicate the size of their families; but little is known of their actual breeding habits other than what is learned from an occasional nest of hairless young found under an old log, board, or other protecting cover. Much remains to be learned of the habits of such obscure small mammals by those who have time and patience to make careful studies of them on their home grounds.

LARGE-FOOTED MEADOW MOUSE: *Microtus richardsoni macropus* (Merriam).—The largest of all the meadow mice, often measuring 8 to 10 inches in total length, are common along the streams and in the meadows and wet places throughout the Canadian and Hudsonian Zones of the park. They are semiaquatic in habits and are rarely found far from water. In many places their large trails and runways extend through the shallow water of the marshes or lead into the edges of small streams or ponds and reappear on the opposite sides. Often along the creek banks one will be seen to jump into the water and swim across the stream deep below the surface. Their dense fur and large hind feet are well adapted to a partially aquatic life, even in the cold streams up to the snow banks. Their burrows often honeycomb the creek banks, and their summer nests, in which the young are raised, are found in cavities to which these burrows lead. In winter some of their big grassy nests are placed on the ground under the deep cover of soft snow, and as the snow disappears in spring their runways show a network of tunnels over the surface.

Grass and sedges form the principal part of their food in both winter and summer. In winter they are gathered from the surface of the ground under snow, and in summer the tender shoots are cut

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along the edges of the streams and along the trails in the marshes. In places the surface of little pools will be found strewn with grass blades, where the mice have been eating their meals on the margins in exactly the manner of muskrats. Green vegetation constitutes practically their entire food for the whole year, and seems always to be easily obtained. The mice do not become fat or show any signs of hibernation, and it is probable that in winter their life is just as comfortable as in summer and fraught with less dangers.

ROCKY MOUNTAIN MEADOW MOUSE: *Microtus mordax mordax* (Merriam).—Specimens of these middle-sized, long-tailed meadow mice have been taken at St. Mary Lake, McDermott Lake, Belly River, Summit Station, Java, Belton, and Indian Creek. They are the most abundant and generally distributed meadow mice of the park, from the lowest levels to timberline. Generally they are most abundant along the banks of streams, in meadows, and about springs, but often they are found on the open mountain-sides under grassy cover or the drooping leaves of bear grass. Their medium-sized burrows and runways are easily found by examining the surface of the ground in almost any meadow or grassy situation, and specimens are readily secured by setting out-of-sight mouse traps across the runways and baiting them with a little rolled oats. They are less aquatic and less adapted to life in the water than the big-footed meadow mice, but are good swimmers and do not hesitate to jump into a creek or river and swim across if frightened or if they wish to visit the other shore. Their thick gray fur is ample protection against both wet and cold, and they often live and seek their food in places that are damp and chilly.

Their food consists mainly of green vegetation, of which grass stems and seeds form the greater part. Along their runways little heaps of grass stems cut into lengths of 1 or 2 inches may be found where the mice have brought down the seeds and blades within reach by simply cutting the stems in sections, and drawing them down each time until the tops were obtained. The contents of their stomachs usually show nothing but the finely pulverized tissue of green vegetation. Seeds or grains, however, are very acceptable and readily taken when offered as trap bait. The mice never come into houses and camps, so that their presence in the park can do no harm other than to the grass which they consume in the meadows.

The four to six young are born in warm, soft grassy nests in the summer burrows and apparently several litters are raised during a season. They have need to multiply rapidly as their enemies are numerous. Hawks and owls, ravens and jays, and weasels, foxes, cats, and coyotes, are always snapping them up as they appear on the surface of the ground. In winter, under the cover of deep snow, they are far safer. When the first soft snows fall they plow little tunnels

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over the surface of the ground, and these become hardened and throughout the winter are avenues of travel and food supply as long as the snow lasts. Many winter nests are built on the surface of the ground and occupied until the snow disappears, when the occupants are again forced to their underground dwellings for protection. The furry coats of these mice become dense and a beautiful light gray during the winter, but the animals do not become fat or show any signs of hibernation. In summer the heavy winter coats are changed for a much thinner and harsher coat of a darker gray color that blends well with the shadows of the half-concealed runways.

Drummond Meadow Mouse: *Microtus drummondi* (Audubon and Bachman).—These little dark brownish-gray meadow mice with moderately short tapering tails are common in the open country about St. Mary Lake, along Swiftcurrent Creek, between Sherburne and McDermott Lakes, at Summit, and on the Big Prairie in the North Fork of the Flathead Valley, where specimens have been taken, but they undoubtedly have a much more general range over the park in suitable localities. They live in meadows and other grassy places generally, but are sometimes found in wet marshes and along the margins of streams and lakes. They are not usually found in the timber, except as they follow meadows or open strips of country. In general habits they are more like the eastern meadow mouse, to which they are related, and their runways and burrows may generally be found under the tall grass and dense vegetation of the more fertile areas. Any naturalist should be able to go to a favorable looking meadow or grassy slope and by parting the fallen grass, find the little roadways and burrows of these mice, but these are rarely seen by the person without the naturalist's training, unless by the farmer in gathering his hay or grain. Out on the prairies the mice quickly gather under the haycocks or the shocks of grain, and when these are removed to the stack they are seen scampering in all directions. While with other rodents they help to lay a heavy tribute on the agricultural products of much of the country, here in the park they are practically harmless and are too obscure and unnoticed to form even an interesting feature of the animal life.

Rocky Mountain Muskrat: *Fiber zibethieus osoyoosensis* Lord.—A few muskrats are found in most of the lakes and along the quieter streams of Glacier Park, but nowhere have I found them so numerous as they are out on the Plains and in the low country. A few tracks were seen around the edges of McDermott and Josephine Lakes and along the river above Upper Waterton Lake, and in 1895 I trapped a specimen in a beaver pond near Summit Station. Don Stevenson reports a family of 11 cream-colored albinos, which he once trapped in Swiftcurrent Lake. Their signs were seen along the Swiftcurrent

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Creek at Sherburne Lake and above, and a muskrat was seen swimming in a beaver pond on Appekunny Creek. Apparently they are not sufficiently numerous to form an important part of the fur catch of the region, but there are enough for tourists occasionally to get a sight of one swimming in a lake or stream or quietly sitting up in a brown furry ball on a log or stone at the edge of the water, munching his breakfast or supper. In the marsh and slough country of the Plains muskrats build numerous houses of mud, roots, and plant stems, but here in the park they live mainly in the banks of streams and lakes. Their burrows enter from below the surface of the water and lead back to cavities in the banks a little above the water level, but usually without any openings to the surface of the ground. In these well-protected bank dens they spend the winter in comparative comfort, and in summer raise their families of young until they, too, are old enough to dive through the waterway and swim out into the light of day on the surface of the lake. The usual number of young produced at a time seems to be from four to eight. An old female taken for a specimen in a beaver pond near Summit Station on June 18, 1895, contained 13 large embryos, evidently an unusual number for one litter. She had the usual number of 8 mammae. She was a very large individual, weighing 3 pounds, and evidently in the prime of life. The young when first born are naked and helpless, but develop rapidly and are soon well furred little muskrats, paddling about in the water and diving with great skill.

Muskrats furnish one of the cheaper furs, not from a lack of beauty or softness, but because the animals are so abundant and widely distributed that vast numbers are trapped each year. Compared with many of the more expensive skins they are equally attractive and give better service, warmth, and wear.

Family CASTORIDÆ: Beavers.

BEAVER: *Castor canadensis canadensis* Kuhl.—Beavers are irregularly distributed over the park, but are fairly common in some sections. Their houses, dams, and ponds are conspicuous along side-streams in the Swiftcurrent Valley above Sherburne Lake, and old houses and dams could be seen far out into the shallow edge of the lake that was being flooded by the reclamation project in 1917. There were also beaver cuttings around the edges of McDermott, Josephine, Grinnell, Swiftcurrent, Upper St. Mary, Waterton, Kintla, and McDonald Lakes, and many of the streams above the lakes in the park. In Gunsight Lake, which lies near timberline, beaver cuttings were noticed along the shore at both ends, and several beavers were watched as they gathered their food and ate it on the beach or on low rocks out in the water. A few tracks and cuttings

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FIG. 1.—BEAVER HOUSE ON THE BANK OF BELLY RIVER NEAR PARK LINE. THE RIVER IS DEEP AND NO DAM IS NEEDED.

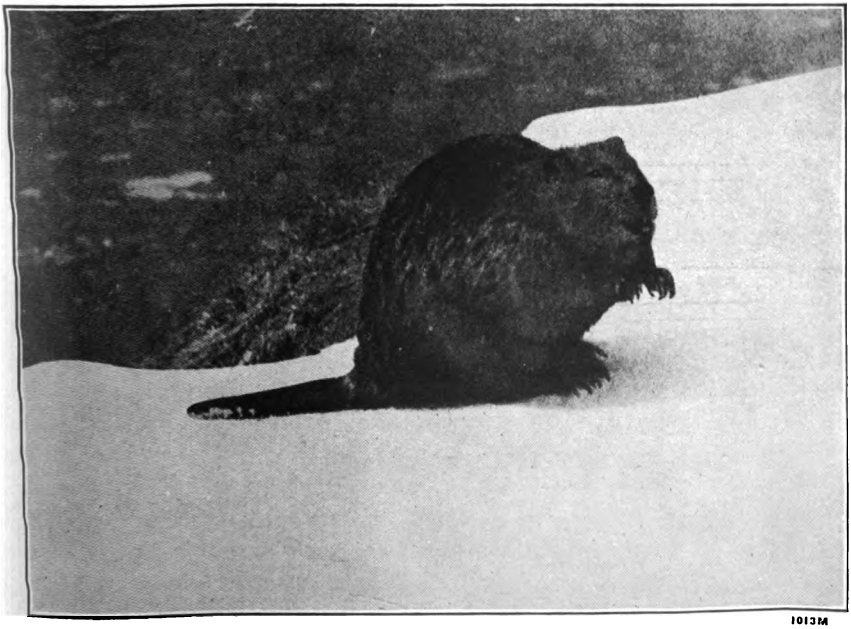

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FIG. 2.—A BEAVER OUT ON THE SNOW AT THE EDGE OF HIS POND IN THE NATIONAL ZOOLOGICAL PARK.

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were found along the edges of Elizabeth, Crossley, and Glenn Lakes in the Belly River valley, and the banks of Belly River were in many places, where beavers were inhabiting the bank dens, conspicuously marked near the deep water by large beaver houses or by aspens that had been freshly cut and were to be dragged into the river for food or building material. Many of the small side streams along this valley had been dammed up by the animals for ponds as good building sites for their houses.

On Belly River near the park line a huge old beaver came out one evening near our camp and worked for a half hour before the darkness closed in and hid him from view. He would go to the shore and cut willow branches and carry them to some shallow beach where he could sit in the water and trim the leaves and bark from the branches for his supper. He would then swim to another place, often with loud splashes of his tail, and gather more willows. Again he would come out on the grassy bank and graze like a cow for some time in the meadow, and in many places I found where the grass had been thus eaten down all along the shores until it was as closely cropped as if by horses or cattle. On a steep bank high above the river this beaver had been cutting aspen trees the previous night and dragging the logs down the steep slope into deep water where they could be floated around the bend to his house or sunk to the bottom of the river for winter food. No dam crossed the river at this point, but the water was deep and permanent, and a large beaver house had been built on the bank. The house was not surrounded by water as those in beaver ponds usually are, but the burrows entered from deep under the bank and came up to the nest cavity inside. The thick walls of the house, built of sticks laid at all angles and firmly plastered with mud, afforded ample protection from all enemies except man, and even man armed with ax and spade has hard work to dig through such walls. During the winter when heavy ice covers the water and the beaver houses are frozen solid the animals are especially safe and comfortable and enjoy the even temperature to which they are adapted. They have usually stored up ample food for the winter's supply in the bark of trees cut and sunk to the bottom of the ponds, but the myriads of tender roots which penetrate the banks of streams and are always accessible from under water apparently form a large part of their food in winter as well as in summer.

As their destruction of timber for building and food purposes is limited almost entirely to small cottonwoods, aspens, and willows of no particular value, the claim that they are doing damage to the forest is generally without foundation, while their dams and ponds are often a great benefit to the country in storing water, providing

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fish-breeding ponds, and affording one of the interesting features of animal life in the park.

While it is possible even now for the tourist to find beavers that can be observed at work, their study would be far more interesting with ten times greater numbers of the animals, and the country would be generally benefited by the surplus that would stock surrounding areas.

The beautiful dense furry coats of the beavers, which adapt them to their peculiar mode of life, have put a price on their backs that has almost proved their destruction. In spite of well-framed laws imposing severe penalties for trapping or killing the animals, the temptation for trappers to sneak in and get as many skins as possible is often too great to be resisted. In spite of every precaution many

Fig. 10.—Cottonwood tree, 46 inches across stump, cut down by beavers near mouth of Camas Creek. Photographed April 14, 1918, several years after it had fallen.

beavers are trapped each year and their numbers are kept down to a very slight increase, if not to a dead level of meager existence.

Family ERETHIZONTIDÆ: Porcupines.

Yellow-haired Porcupine: *Erethizon epixanthum epixanthum* Brandt.—Porcupines are sufficiently common in the park to be often seen by the visiting tourists. At Granite Park one usually came around the chalet every day and did not seem to mind being shut up occasionally in the woodshed where he could be released after the tourists had arrived over the pass at noon and be watched by a large number of people as he shuffled down the trail and over the big snow bank to the rocks beyond. Several years ago while this

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chalet was being built porcupines were numerous and troublesome about the construction camp. Their principal mischief consisted in cutting the tent ropes at night so that the tents would often fall over before morning. They also did some damage to the camp provisions, being especially keen in their search for bacon and salt pork. The cook finally vowed vengeance on all porcupines and, armed with a stout club, is said to have slain 150 of them at night about the camp before their raids ceased to be troublesome. This was evidently at the crest of their wave of abundance, as it is well known that they increase slowly until in many places they become numerous and then decrease for a term of years until they are again scarce.

During the summer of 1917 porcupines were moderately common throughout the park and were occasionally seen along the trails or about the camps and chalets. Their little flat-footed, oval, rough-soled, toed-in tracks are often seen in the dust along the trails which they sometimes follow for miles at night, and occasionally one of the animals is overtaken as it shuffles slowly along on its short legs. M. I. Berger was fortunate enough to meet one when the light was strong enough for a good photograph. Their presence is more often noticed, however, by the patches of raw wood on the pine trees from which they have gnawed the bark for food, and one needs only to ride through the forest to learn how common porcupines are in any section, or examine the scars to tell in what year they were most numerous.

In almost every camp and abandoned cabin in the park one may see where the animals have gnawed the floors or doors, boxes, tables, or any wood that has become impregnated with salt or grease or a flavor of camp food. Boxes in which camp supplies have been kept are usually almost devoured; sometimes only a few boards are left that have not been chewed up by the porcupines. The boards of an old floor are sometimes gnawed through, and the table if left in a greasy and soiled condition is likely to be entirely eaten up. Marks of the big chisel-like incisors of porcupines show on the boards and in wood that has been gnawed, and their large oval sawdust pellets are generally found scattered around the floor of an old camp. At some of the camps the quills and bones of animals previously killed by campers are found, but unless the animals are so numerous as to be really troublesome they are usually not disturbed.

At the lower end of Glenn Lake I came across a camping party from the farming country below, spending a week in the beautiful valley, and the man finding that I was interested in the animal life, showed me a very large porcupine which he had that morning killed at camp. It proved to be a handsome old male with a rich coat of long yellow hairs and a dense armor of quills bedded in the black fur underneath. Several men who lifted it estimated its weight at

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40 to 50 pounds, and I think they were not far from correct. My own estimate was 35 pounds as the lowest possible limit, but we had no scales or any convenient means of accurate determination of the weight. It was unusually large, however, and showed some interesting features. Although a male the four abdominal mammæ were almost as conspicuous and well developed as in the females and were arranged as usual in a large quadrangle in the middle of a very large abdomen. The man apologized for killing the porcupine, which he had driven away from the camp several times on two successive evenings, but it insisted on returning and had climbed into his wagon and eaten pieces out of his harness, bridles, and halters until he was afraid there would be no harness with which to return to the ranch. To protect his property he had finally taken an ax and smashed the skull of Mr. Porcupine so badly that there was not enough left to make a good specimen.

Fortunately dogs are not allowed in the park, so the principal objection to porcupines, the unpleasant misunderstanding between rodents and canines, is avoided. Apparently the wild carnivores that have had a longer acquaintance with them have a better understanding of the nature of their defense and do not often get into trouble.

The erroneous impression that porcupines can throw their quills is surprisingly common among those unacquainted with animals, and often the first question asked is how far can they throw their quills and make them stick. The tradition is perhaps an important protection for the uninitiated, for the porcupine is not a safe animal to play with unless the mode of defense is understood. The powerful muscular tail is heavily armed above and on the sides with quills set at all angles, and an upward or sidewise blow from this tail will drive the quills deeply through clothing or shoe leather with very painful results. The porcupine's method of defense is to keep its back to the enemy, with quills erect all over the body and with quick, powerful strokes of the tail to inflict as much injury as possible. With its short legs an effort to escape is useless and rarely attempted. When approached at close quarters porcupines will often climb a tree if one is convenient and take refuge among its branches or sit on the side of the trunk, resting woodpeckerlike on the stiff, bristly coat of the under surface of the tail, which is held pressed against the bark.

In summer the principal food of the porcupines is green vegetation, of which they eat practically everything that comes their way, until their enormous stomachs are filled. In winter their principal food is the inner bark of pine trees. Occasionally the Douglas and Engelmann spruces also are gnawed, but their favorite food trees seem to be the lodgepole, limber, and white-barked pines. Large patches of bark are gnawed from these trees, sometimes at the surface of the snow anywhere from 1 to 6 feet from the ground, or on

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Photo. by Mr. and Mrs. M. I. Berger. 808M

FIG. 1.—YELLOW-HAIRED PORCUPINE RETREATING DOWN A FOREST TRAIL IN GLACIER PARK.

Photo. by Mr. and Mrs. M. I. Berger. 809M

FIG. 2.—A PORCUPINE MET ON THE TRAIL NEAR SUN CAMP, PAUSING TO MAKE SURE IF RETREAT IS NECESSARY.

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the sides of the trunk up among the branches where some limb has served as a rest while the animals were getting their breakfasts of bark, or even on the branchless trunk of a tree where while feeding they have rested in perfect comfort on the bristles of their tails. Usually a patch of bark the size of a hat seems to have served as a meal, but in many cases several meals have been made from the same part of the tree and occasionally the bark is removed clear around the trunk in a broad band that completely girdles and kills it. In other cases some of the branches are thus peeled and killed or the top of the tree may be girdled and the future shape of the tree entirely changed. When abundant, porcupines often do considerable damage to the forest, but in ordinary numbers this injury is not very serious. When they become very numerous they should undoubtedly be destroyed, but in their present abundance they merely add a feature of interest for many of those visiting the park.

The theory that porcupines should never be killed, as they might furnish food to some one who was lost in the woods, has very little value as a practical precaution. Generally anyone who will get lost in the woods would not know enough to kill and skin and cook a porcupine if the opportunity were offered, and it might be several days before one could be found. Porcupines are fairly good eating, however, and the Indian method of cooking them is very simple and could be adopted by anyone capable of wielding a club and building a fire. Without any preparation whatever the porcupines should be buried in coals, or placed on a fire and more fire built on top of them, and left to roast for 20 minutes or a half hour. When properly cooked they should be drawn from the fire and the shell of burned quills and skin broken off the outside, when the meat will be found white and tender and well cooked underneath. One would not have to be starving to enjoy such a feast, but the meat is apt to have a flavor of the pine bark, and while thoroughly wholesome and nutritious the flesh of an old porcupine is not an epicurean dish.

Family ZAPODIDÆ: Jumping Mice.

Rocky Mountain Jumping Mouse: *Zapus princeps princeps* Allen.—Jumping mice are graceful, slender little animals with very long tails and long hind legs and feet. They are kangaroolike in build and form, with tiny hands that are rarely used for aid in traveling. Their slender tails are much longer than the head and body, and their rich buffy sides, dark buffy gray backs, white bellies, and pointed ears combine to make an animal of unusual beauty. They are common in the park region and often are the principal animals caught in a line of mouse traps. They live mainly in the meadows and open grassy slopes, where there is ample cover of grass, plants, and bushes for

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their protection. They do not make runways, and their presence is rarely detected unless they are occasionally seen when disturbed in the daytime bounding away from one's feet in long leaps through the grass. Their summer nests are usually placed on the surface of the ground and are well concealed by sheltering vegetation. These are neat little balls of grass with a hole in one and sometimes in two sides to serve as doorways. As one steps near a nest the mouse usually bounds out and gives two or three long leaps and then stops to wait for further developments. By noting the place where it stops and by creeping up cautiously one can almost invariably catch the mouse by clapping the hand down quickly over it. When thus captured it does not seem much alarmed, and when held gently in the hands for a little time becomes quiet and may be examined at leisure. The mice rarely offer to bite and seem much more gentle in disposition than most species. If suspended by the tip of the tail one will almost invariably curl up until it can reach the base of the tail with its hands and then, like a sailor climbing a rope, come hand over hand up the tail to the fingers holding it. If shaken down it will repeat the operation again and again, much to the amusement of the onlookers and with no harm to the ropelike tail.

Photo. by C. Birdseye. B12861
FIG. 11.—Jumping mouse, from photograph of a captive individual at Florence, Mont.

The food of jumping mice consists mainly of seeds of grasses and other small plants. To obtain the seed-laden heads of tall grasses they reach up and cut off the stem and draw it down to the ground; then, repeating the operation, they cut off sections and draw the stem down until the seeds are brought within reach. These are eaten and other stems are cut and drawn down in the same manner until a good square meal is obtained. The sections of grass stems thus cut are usually three or four inches long and can always be recognized as the work of this mouse, in distinction from those of the other mice with shorter legs that can not reach so high and consequently cut their grass stems into shorter sections. Little heaps of these long grass sections scattered through the meadows will often indicate the presence and abundance of the species and give the naturalist a clue to places where his traps will yield specimens.

The four to eight young are born in the grass nests, and by early autumn have become almost full grown and are laying in a supply of

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fat for winter. Unlike most of our native mice they do not lay up stores of food, but become excessively fat, and with the first cold weather of autumn enter a long period of hibernation. Soft, warm winter nests are constructed in little cavities well under ground, and in these the mice curl up for their long winter sleep. Usually they are not found abroad after the first killing frost in September and are not again seen until the snow has disappeared in April or May. They are among the most harmless and attractive of the great variety of little animals to which the odious name of mouse has been unjustly given. They do not belong to the same family as any of the other so-called mice or small rodents of the region, and in some respects show a closer relationship to porcupines than to any other animal of this country.

Family GEOMYIDÆ: Pocket Gophers.

SASKATCHEWAN POCKET GOPHER: *Thomomys talpoides talpoides* (Richardson).—These plumbeous-gray pocket gophers belong to the Plains country and may generally be distinguished from the rusty brown form inhabiting the mountains by color, slightly larger size, and in the females by the six pairs of mammae instead of four.

Photo. by N. H. Kent. M498

FIG. 12.—A pocket gopher of the genus *Thomomys*, photographed from a captive individual.

Specimens have been taken in the Swiftcurrent Valley between the Sherburne and McDermott Lakes and on the Belly River at the ranger station. In both these valleys they are abundant in the open prairie-grass areas, but apparently they do not go into the timbered or mountainous part of the park. Over the plains to the eastward they have a wide range through western Montana and Saskatchewan and eastern Alberta. Among the prairie grasses their little mounds of fresh black earth are conspicuous at intervals along the lines of their underground tunnels, but the animals are rarely if ever seen even by the inhabitants of the country. Practically their whole lives are spent underground, except when for a few minutes an opening is made to the surface, the loose earth pushed out, and a few plants quickly cut and stuffed into the capacious and fur-lined cheek pouches to be carried back into the burrows

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and, after the doorway has been securely packed full of earth, eaten at leisure.

Long front claws and powerful muscles peculiarly fit them for digging and tunneling underground, and their burrows are extended day after day through the rich soil, a few inches to a foot below the surface, where the endless variety of roots and bulbs and underground vegetation encountered furnishes them ample food throughout the year. There is plenty of moisture in their food so that water is not necessary, and they rarely leave the burrows. Occasionally in spring males do leave in search of mates, but generally there is sufficient underground communication to make even this unnecessary.

During most of the year there is but one pocket gopher to a set of burrows, and while their lives may seem like solitary confinement at hard labor, these rodents are evidently as happy and contented as other and more sociable animals. Their houses are comfortable and without sudden changes of temperature. They have clean, sweet-smelling, fresh earth walls, which are always being extended into new ground as the old burrows are abandoned. Roomy chambers are built along the tunnels, and the four to six young are brought forth and cared for in dry nest-chambers, while food is stored in other chambers excavated for the purpose. Their small eyes and ears are of minor importance in the dark underground galleries, but the sensitive nose and tip of tail guide them in their shuttlelike motions backward and forward through the tunnels, and apparently they travel with equal facility in either direction. As soon as the young are old enough to make their own burrows and get their own food they strike off in new galleries, and soon each is launched on its independent career. When little more than half grown they usually leave their mother's burrow and may not see another of their kind until the following summer when the sex impulse urges them to search for mates.

They are sturdy fighters, and with large chisel-like incisors and powerful muscles they defend their homes against most enemies of their own size, except the weasel and the gopher snake, which quickly dispatch them when once an entrance is gained to their tunnels. Hawks, owls, bobcats, foxes, and coyotes snap them up occasionally when they are throwing out earth from their burrows, but their main protection is in keeping well out of sight and thoroughly barricaded under ground.

On farms they do a great deal of mischief in destroying crops. They are fond of potatoes, turnips, carrots, beets, onions, and practically all underground crops, and they cut the roots from fruit trees and berry bushes, cut the growing grain and draw it into their burrows to be eaten, and with their mounds of earth cover up the young grain, clover, and grass. While practically harm-

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less on the open range, they are naturally considered undesirable tenants in cultivated land, and their destruction is often necessary to successful agriculture. Fortunately, they are easily trapped and poisoned and can be eliminated from the farming areas at slight expense of time and trouble.

Pocket-gopher flesh is as good as that of rabbit or squirrel, and as the animals are always healthy and of exemplary food habits there is every reason for utilizing them as food. A camp cook who is also a good trapper can in many localities supply his party with an occasional feast of pocket-gopher stew at any time during the summer without violating the game laws.

Brown Pocket Gopher: *Thomomys fuscus fuscus* Merriam.—These small buffy brown pocket gophers are easily distinguished from the larger, grayer species of the Plains, and in adult females the mammæ are arranged in two posterior and two anterior pairs. They are the only pocket gophers inhabiting the higher parts of the park, where their range is by no means continuous or general. Specimens were collected on Big Prairie, in the North Fork of the Flathead Valley, in the garden back of Glacier Park Hotel, at Summit Station, and near the lower end of St. Mary Lake; and characteristic mounds were seen in other places in the park. In 1895 the mounds were found near timberline south of Red Eagle Lake, and in 1917 on the pass between Chief Mountain and Gable Mountain in the open Hudsonian Zone. As these pocket gophers do not inhabit the timbered areas, their range in this region is much more restricted than in the more open country to the south and west. Little open parks and dry meadows are their favorite haunts wherever they can find an abundance of mellow soil in which to burrow and vegetation for food. Their hills and burrows are noticeably smaller than those of the larger species of the Plains, but otherwise their habits are essentially the same. The mounds often extend in irregular lines for long distances over the ground, and each shows some indication of the length of time that has elapsed since it was brought to the surface. Usually a few are of fresh loose black soil that has not been rained on, some are dotted over with a sprinkle of drops, and others washed smooth and rounded by one or more heavy rains, while those of the early springtime are packed and hard, and grass is growing up through them. The winter activity of pocket gophers is shown in the long snakelike molds on the surface of the ground where the soil has been pushed out under the snow and left in long snow tunnels. These have frozen and then become packed and cemented until, as the snow disappears from above, the hard forms have remained through the summer. Usually the mounds are 5 to 15 feet apart along the tunnels or often in groups as the tunnels run in circles

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and the mounds are close together. Deer and other animals often step on the soft ground over the tunnels and break through, but the opening is promptly closed by the occupants. As the older burrows become more broken up, however, they are gradually abandoned and closed up back of the fresher tunnels which are always kept in good repair.

In the hotel gardens at Glacier Park seven or eight pocket gophers were reveling in the beds of onions, peas, beans, and potatoes. I caught two of these in the onion beds, from which most of the young onions had disappeared as far as the pocket gopher hills extended, and found their stomachs well filled with onions and their whole bodies strongly scented with them. Two others caught in a patch of green peas had cut and dragged the plants into their burrows and eaten them—tops, peas, and all—so that along their lines of travel nothing but weeds remained. Their stomachs were full of pea vines, and the characteristic odor of the plants was very noticeable when the pocket gophers were being skinned. These four were taken one evening with two gopher traps, but as I was leaving early in the morning I did not have time to get the remaining animals, and they probably spent the summer feasting on fresh young vegetables that were not intended for their use. An hour's trapping would have removed all from the garden, and as others slowly worked their way in from the surrounding grassland they could easily have been caught. With a long-bladed knife or flat stick it was a simple matter to follow down the closed tunnel where the soil had been thrown out until the open burrows were found 6 or 8 inches below the surface; then, by cleaning out the loose earth with my hand and slipping a gopher trap down into the burrow and half closing the opening thus made, it took but a few minutes to place the trap where it would catch and kill the animal when he came along. These animals were caught in the Macabee gopher trap, but several other kinds are almost as effective.

Pocket gophers never become fat and do not hibernate, so in winter their burrows merely run deeper below the frozen ground and they still obtain ample food from the roots and underground vegetation. The passages are usually kept open to the surface of the ground, where the loose earth from the excavations is pushed out under the snow, and along these surface tunnels some food is obtained from green vegetation and the bark of trees and bushes.

While the home life of these animals forms an interesting subject for close study, it is so difficult to observe them that few people take any special interest in them or usually notice more than their little earth mounds on the surface. Those who are raising crops or gardens are the ones most likely to be interested in them, and this from purely economic reasons. What little is known of their habits

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is chiefly through trapping, either for specimens or to protect crops and trees, but the more difficult and more interesting task of excavating their lengthy tunnels and making a thorough study of their homes and of the animals when captured alive remains to be performed by some one with ample time and qualities of keen and accurate observation. Practically nothing is known of the breeding habits and family relations of these animals, and few specimens of the very young have ever been seen even by naturalists. The number of embryos in females collected for specimens is usually four or five, and apparently but one litter is raised in a season.

Order LAGOMORPHA: Rabbitlike Animals.

Family OCHOTONIDÆ: Conies.

CONY: *Ochotona princeps* (Richardson).—The cony, pika, little chief hare, or calling hare, as variously designated in published reports, and McGinty rabbit, as sometimes called locally, is an odd little rabbitlike animal the size of one's fist, with short round ears, short legs, and no tail at all. The fur is a brownish gray color which blends perfectly with the rocks among which the animals live and renders them practically invisible except as they move or utter their little lamblike bleat.

Conies are common throughout most of the beds of broken slide rock, or talus, near timberline of the whole park region. In 1895 I collected specimens on the high ridges southwest of Red Eagle Lake, and in 1917 found them in Gunsight Pass, near Blackfeet Glacier, in Piegan Pass, near Granite Park, on the side of Chief Mountain, on Kootenai Pass, and near Waterton Lake. Generally they were in the Hudsonian Zone and often at its extreme upper edge, where the last traces of depauperate trees are found; but where the slide rock extends far down the side of the mountain they follow it also to lower levels, and at the north end of Waterton Lake they were common in an extensive talus slope at the lower edge of the Canadian Zone only 50 feet above the level of the lake. The prime requisite for their habitat is a mass of broken rocks under which they can take refuge and make their homes safe from numerous enemies. Wherever extensive rock slides are found the conies may be looked for. In Piegan Pass one lived in the mass of broken diorite, a little above where the trail crosses the summit, and in Gunsight Pass their calls were heard from a mass of broken rock just south of the trail. On Kootenai Pass they were calling from the rocks close to the trail on the southernmost of the two summits over which it leads. In Swiftcurrent Pass there are good rock slides just west of the summit, and while I did not hear any of the conies in them, remains of their last

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winter's haystacks and abundant signs were seen not far away, to the north of Granite Park. Just east of the point where the trail crosses the ridge west of Chief Mountain they were calling loudly from the slide rock along the side of the little meadow, and as I dug some little wild onions for my lunch one watched me with evident interest and an oft-repeated *yamp, yamp.* Apparently he could not make out what kind of animal I was nor why I should be digging grass in his meadow where all of the scanty hay was needed for his winter supply.

During the short, bright summers of these high altitudes conies are busy little people energetically gathering the grass and sedges and various small plants and storing them for winter use under the rocks, where they dry and become like well-cured hay. A great variety of plants are thus collected and apparently nothing is rejected that has green foliage or stems. As the cold weather draws near they redouble their energy, and the haystacks grow steadily until the first permanent snows close in and bury both hay and haymaker. As storm after storm sweeps over and the mountains are buried deeper and deeper under the winter blanket, the conies are well protected from both the severe weather and the attacks of numerous enemies. Deep under the rocks they can come and go for long distances and undoubtedly visit back and forth and perhaps exchange dainty selections of hay with their friends and neighbors. In June, when most of the big snow banks have melted over their rock piles, a few little sticks and dry stems and particles of the hay are all that remain, but the conies are out gathering the tender green plants as they come up from the newly warmed earth. Their long, furry, winter coats are gradually exchanged for thinner and harsher summer wear, but otherwise they are the same timid, bright little animals of the previous autumn and none the worse for being buried seven or eight months under the snow.

The three or four young are born early in June, and by the middle of July are usually found running about over the rocks with their parents, and by the middle of August are helping to store the next winter's hay crop. As they scamper about over the rocks with their furry-soled feet, noiseless as the flight of an owl, they are rarely seen except by those who know their voice and something of their habits and the nature of their habitat. They are very timid, and at the first alarm dive like a flash out of sight among the rocks, but if one secures a good position from which to watch and sits quietly for a few minutes they will reappear as noiselessly as they disappeared and often sit and watch the strange intruder at close range for many minutes. Occasionally they will open their mouths and emit a squeaky *yamp* while they watch closely to see

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what effect it has on the intruder. Those at a distance often take up the call note, which seems to be a warning signal, and, with patience, one may often have them calling on all sides. Finally deciding that there is no danger, they will resume their work and run back and forth from the meadows to the rock-sheltered haystacks with great wads of grass and flowering plants in their mouths or sit on the rock points to munch their midday meal of grass stems or other green plants. It is usually possible with patience and perseverance gradually to win their confidence until they can be photographed at 6 or even 4 feet from the camera. They are such gentle little animals that it seems strange they have not been tamed and introduced as pets for children, but it is doubtful whether they would thrive away from their native rock piles.

Family LEPORIDÆ: Rabbits and Hares.

SNOWSHOE RABBIT: *Lepus bairdi bairdi* Hayden.—The large woods rabbits, pure white in winter and dark brownish gray with white feet in summer, are common throughout the whole timbered area of Glacier Park, mainly in the Canadian Zone. They are so protectively colored in both winter and summer as to be inconspicuous and not often seen, but their little trails through the bushes and their large flattened pellets of sawdust droppings may usually be found anywhere in the woods. Occasionally one is seen in a trail or road early in the morning or evening or is frightened out of its form under a bush or log and goes bounding away with conspicuous flashes of the big white feet until at a little distance it suddenly stops and sits down on the white feet, absolutely lost to view. More often one will sit quietly close to the trail or allow a person to pass near without making any move or sound. Even when they do run their softly padded feet make little sound and they generally escape without being noticed. Near the St. Mary Chalet at dusk one evening I saw one sitting in the trail at the edge of the woods. It had evidently found some salt or scattered grain which it was eagerly picking up from the ground, and by approaching slowly and talking softly to it, I was able to come within about 15 feet before it became alarmed. Unfortunately the light was too far gone for a photograph, but the rabbit ran only a few feet away and then stopped to wait until the coast was clear for a return to its feeding ground. Apparently it would not be difficult to bait them along some of the woods trails in order to study them at close range.

The food of these rabbits consists of green plants of a great variety, especially the wild clovers and leguminous species, and in winter chiefly bark and buds from twigs and bushes. As the snow gets deeper it only raises them higher up to a new supply of choice buds

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and bark, and few animals are better adapted to deep snow and rigorous winter climates than these densely furred and well-shod snowshoe rabbits. The long coarse hairs of the feet spread and help carry them over the surface of even the soft snows, while over well-packed or crusted snows they scamper with evident enjoyment and wonderful speed.

Their mating time is early in spring, and the four to six young, born in May or June, are soon big enough to pick tender green vegetation as a part of their food. When first born they are well-furred, perfect little rabbits with sharp incisor teeth and open eyes, and of such a soft, shadowy, woodsy color that it would seem they must defy the keenest eyes of owl or fox. About the time of the first snows in autumn the white hair begins to appear through their coats and they are at first grizzled and mottled, but later, as the whole world about them becomes pure white, they rapidly acquire the full white coat of winter.

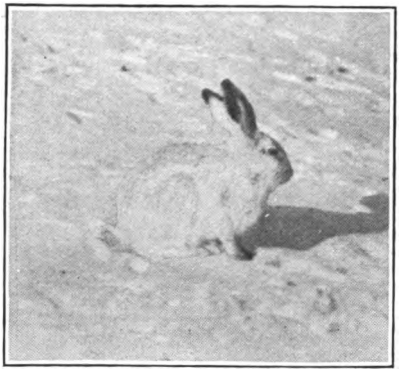

Photo. by Norman McClintock. 1018M

FIG. 13.—Northern white-tailed jack-rabbit, photographed at Fort Yellowstone in March, 1917.

They do not become fat or hibernate, but seem always to be plump and healthy, and for food are among the most delicious of all the rabbits. Their arch enemy, the Canada lynx, is also common throughout this region and probably more than any other animal keeps their numbers down to a minimum. Hawks, owls, foxes, and coyotes occasionally prey upon them but often are unable to capture them, either by stealth or in a test of speed.

PRAIRIE JACK RABBIT: *Lepus townsendi campanius* Hollister.—These big white-tailed jack rabbits with gray summer and pure white winter coats are common over the Plains along the eastern side of the park and extend in open areas up to the edge of the timber. In the Museum of Comparative Zoology, at Cambridge, there is a specimen collected by Dr. Coues, August 16, 1874, and labeled Chief Mountain. This may have come from the open country at the base of Chief Mountain or from the Belly River valley, but as the park line cuts through the middle of the mountain there is some doubt as to whether it was collected in the park or outside. Rabbits are most likely to be seen along the stage road to St. Mary, or from St. Mary around to the Swiftcurrent Valley or in the open parks along Belly River.

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Once seen, there can be no mistaking the species, for large size, long ears, and a big white puffy tail are conspicuous characters, to be recognized almost as far away as the white rump of the antelope. The animals are strictly prairie dwellers and are generally seen as they bound out of their forms in the grass where they sit during most of the day. Their long leaps above the prairie grass are almost as startling as the white flashes of the white-tail deer in flight, and their speed is perhaps exceeded only by that of the antelope and greyhound. As game animals they afford good sport in shooting, and their meat is considered excellent.

Their food in summer is mainly of grass and the leaves of tender prairie plants or any growing grain, clover, or alfalfa that may be found on farms, while in winter it is chiefly of twigs, bark, and buds. In farming sections jack rabbits often do some mischief during the winter season in cutting off young fruit trees and bushes, but over most of their range they are a harmless and valuable game animal.

Order CARNIVORA: Flesh Eaters.

Family FELIDÆ: Cats.

MOUNTAIN LION: *Felis hippolestes* Merriam.—The northern pumas, cougars, or mountain lions are still common on the west slope of the mountains in Glacier Park where the dense forest and abundance of deer offer them unusual advantages in safe cover and ample food supply. On the east slope they are comparatively scarce, and I have only one definite record of tracks seen, one at Iceberg Lake in November, 1907, by Donald H. Stevenson. In many years' residence in the park he found no other tracks on the east slope, but found them common on the west, and reported about 24 lions taken each year. In 1917, Park Ranger Gibb told me of 11 killed by one hunter in the North Fork Valley during the preceding winter. Apparently they are still almost as numerous as they were in 1895, when I first went through the park region. At that time they were common all along the west slope of the park, and at one of my camps just west of the park I had the unusual pleasure of hearing one's wild cry in the mountains at night. It was not the childlike scream of the young horned owl, so often attributed to mountain lions, but a long, hoarse *woh-u-p-o-u* somewhat suggesting the roar of a lion, but more like the exaggerated caterwauling of the back yard tomcat in its deepest and most pensive mood. This prolonged call was repeated at intervals of about one minute as the animal passed through the forest not far from camp, and could be heard for a long distance in the still night. On only two other occasions have I heard this cry in the woods, and once in the National Zoo-

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logical Park, and while it may not be the only call of the mountain lion, it is certainly very different from the wild scream usually attributed to it.

During the winter of 1899, A. Henry Higginson, while camped at the southern border of the park, in the vicinity of Nyack, found these animals abundant throughout the forest. One was shot near his camp, and the carcasses of two deer were found on which they had been feeding. As his man was returning late one evening a mountain lion followed him to within 50 yards of the cabin door, as was shown by its tracks the next morning. It seems to be a common habit of these animals to follow a man at a safe distance, but there are few records of their attacking human beings. It is not unusual to find their tracks near camp in the morning, but the animals are

FIG. 14.—Two mountain lions that will kill no more game. The only good mountain lions in a big game country are those gathered in by hunters and trappers.

so silent and stealthy that they are rarely seen, even where most numerous.

In this region their food consists mainly of the white-tail deer, which abound on the west slope of the park, but it is probable that they get some elk and moose and occasionally mountain sheep and goats. When a deer is killed they often return to the carcass for a second feed, but as often move on and kill another deer when hungry. One deer every few days would be a fair estimate of the game destroyed by each of these big cats, and a hundred deer a year would probably not be too high for each adult.

The young are usually three or four to a litter, but as many as eight are recorded for this species. As soon as old enough to travel with their mother they join in the venison feasts, which, to satisfy

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Photo. by Jacob Neitzling. B1111M

FIG. 1.—HALF-GROWN MOUNTAIN LIONS IN TOP OF A YELLOW PINE WEST OF GLACIER PARK.

Photo. by Jacob Neitzling. B1112M

FIG. 2.—THE SAME LIONS IN ANOTHER POSITION.

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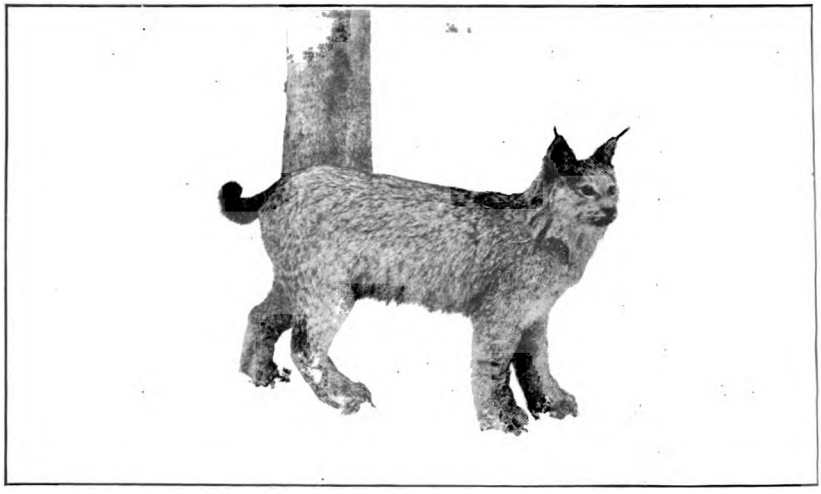

FIG. 1.—CANADA LYNX. MOUNTED SPECIMEN IN BIOLOGICAL SURVEY COLLECTION IN U. S. NATIONAL MUSEUM.

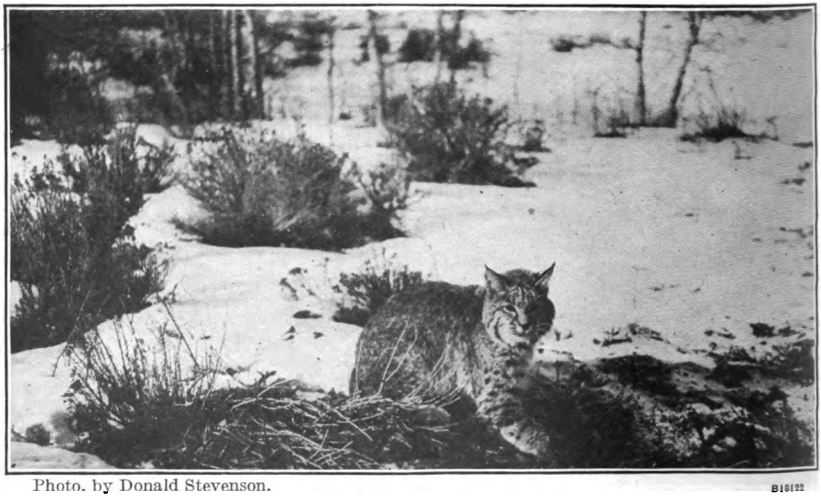

Photo. by Donald Stevenson. B16122

FIG. 2.—THE LARGE NORTHERN BOBCAT IN WINTER FUR. CAUGHT IN TRAP IN WESTERN WYOMING.

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their growing appetites, require the slaughter of a large quantity of game. As the lions are almost never seen except by hunters, their contribution to the interest of the park is negligible, and some effective means should be taken for their destruction.

CANADA LYNX: *Lynx canadensis* Kerr.—These short-tailed, tassel-eared, big-footed cats are more or less common throughout the Glacier Park region. Their actual weight is usually no more than that of the large northern bobcat, but owing to their longer legs and longer fur they have the appearance of being much larger. A large one taken by Stevenson weighed 28 pounds. They are readily distinguished from the bobcat not only by the large feet, long legs, and light gray color, but most infallibly by the solid black tip of the short tail.

Their range covers the whole park region, especially in the timber and brushy areas where the snowshoe rabbits abound. In 1895 I found their tracks in the woods about St. Mary Lake, and one was caught near timberline, just north of the lake, in a bear trap baited with mountain sheep. Don Stevenson, who has trapped and shot many of them in the area now comprised in the Glacier Park, says he has never known of their killing any game larger than snowshoe rabbits and grouse. He says also that he has heard them make a cry not unlike a young puppy in distress. Park Ranger Gibb and Park Guide Gird, who trapped in this region before it was made a park and have been familiar with the country ever since, also report the lynx as common, and J. E. Lewis, at Lake McDonald, tells me that their skins constitute one of the important furs in the catch of the trappers in that region. The animals, however, are rarely seen by anyone in summer and seldom even in winter by the hunters and trappers, unless caught in traps or their tracks followed on the snow until the animals are forced out of their daytime concealment. Their hunting is mainly but not entirely at night, and with soft, furry feet, stealthy habits, and owl-like silence, they are expert in keeping out of sight.

The snowshoe rabbit is their principal game, and with its abundance they increase or decrease in a mysterious synchronism that has given them the reputation of being partially migratory. It seems more probable, however, that in years of well-fed vigor they breed and multiply more rapidly, and in lean years, perhaps, fail to breed or even in some cases become so weakened by hunger as to fall prey to disease or enemies. At all events, during years when rabbits are abundant they, too, become abundant, and when there are few rabbits they are correspondingly scarce. While evidently a great part of their food consists of rabbits, grouse, squirrels, and other small game, the fact that they have been found by Charles Sheldon killing

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full-grown mountain sheep in Alaska[1] is sufficient evidence that they are a menace to many of the large game animals. From their abundance and stealthy habits it would seem almost inevitable that the young of mountain sheep, deer, and goats must suffer greatly from their depredations, and as their presence adds little of interest to the park, they could certainly be well spared in the interest of game protection.

BOBCAT: *Lynx uinta* Merriam.—The northern bobcat, wildcat, or bay lynx, while one of the largest of the group, has the appearance of being much smaller than the Canada lynx, owing to its shorter legs, smaller feet, and shorter fur; but in actual weight it apparently equals, if it does not exceed, the Canada lynx. The type of the species, an old male collected at Bridger's Pass, Wyo., weighed 31½ pounds. In color bobcats are variable from buffy to rich ochraceous gray, with heavily spotted belly, sides, and flanks. The ear tassels and facial ruffs are not so prominent as in the Canada lynx and the tip of the short tail is white with a black band above.

Bobcats are not common in the Glacier Park, but I have seen their unmistakable tracks along the shores of St. Mary Lake, and Gird tells me that there are a few in the lower areas of the park. They belong mainly to lower zones, the Transition and Austral, and are common along the cliffs and canyons of the lower levels of the State.

Their game is principally cottontail rabbits, ground squirrels, pocket gophers, mice, and other small animals and birds, but the freedom with which they kill and eat domestic sheep would indicate that they are not safe animals to have in a region where the increase of large game is to be encouraged. They have the reputation of destroying great numbers of young deer, mountain sheep, and other game animals, and it is fortunate that they do not reside in the park in abundance.

Family CANIDÆ: Wolves and Foxes.

GRAY WOLF: *Canis nubilus* Say.—Along the eastern edge of the park, in the open country, are still found the large light-colored plains wolves, known also as buffalo wolf, loafer, and lobo, and a few occasionally range up through the valleys and over the high parts of the mountains. J. E. Lewis tells me of two that were caught on Flat Top Mountain in the winter of 1916–17, and along the trails in the Belly River valley in August, 1917, I saw wolf signs that were not very old. The wolves had evidently been down in the cattle country as the sign was composed mainly of cattle hair. Don Stevenson reports them in the country about Chief Mountain for

[1] Wilderness of the Upper Yukon, by Charles Sheldon, pp. 314–315. Scribner's, 1911.

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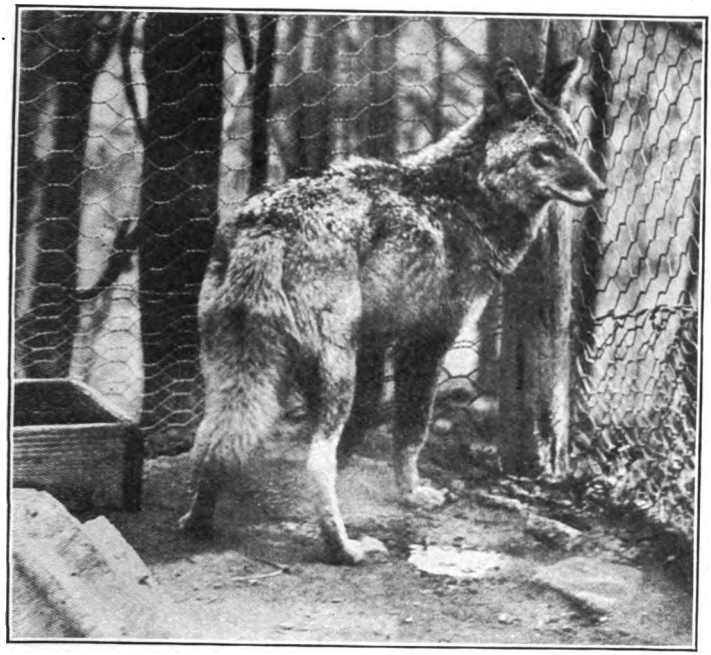

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FIG. 1.—CAPTIVE COYOTE IN NATIONAL ZOOLOGICAL PARK.

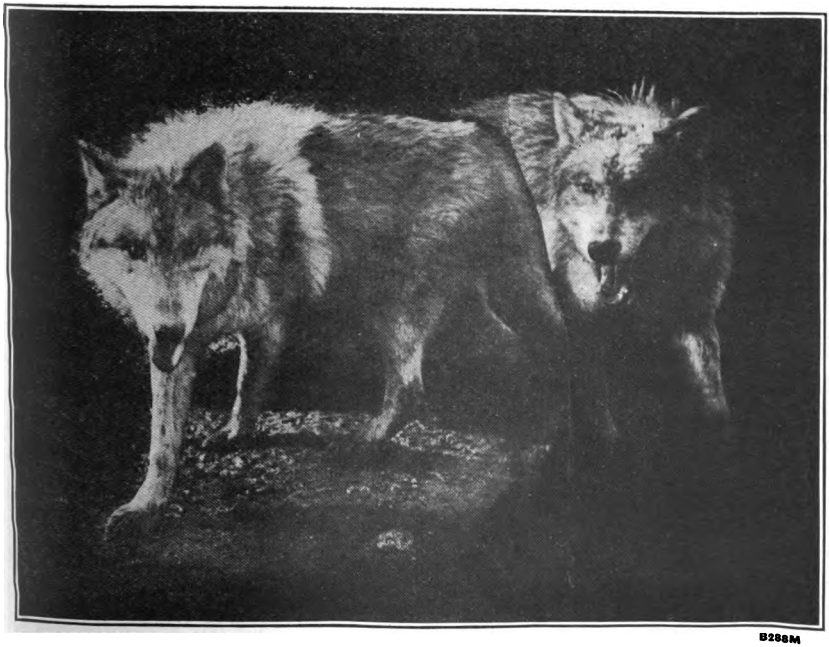

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FIG. 2.—CAPTIVE GRAY WOLVES FROM GREEN RIVER VALLEY, WYO., IN NATIONAL ZOOLOGICAL PARK.

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the past 20 years, where they have ranged up and down the edge of the Plains killing cattle and some horses, and in 1914 he saw their tracks on St. Mary Ridge at the park line. There are said to be some in the North Fork Valley, where it is probable they are attracted by the abundance of deer, as they are on the eastern border by the abundance of domestic stock. In 1895 they seemed to be no more common than at the present time, as I saw then only a few tracks on the prairie below St. Mary Lake, and some fine skins among the Indians on the Blackfeet Reservation.

As the valleys settle up, more vigorous hunting and trapping is likely to crowd the wolves back into the park at any time and make them more numerous than they are at present. If so, their destruction of game will be correspondingly increased, and the sheep, goats, deer, elk, and moose will suffer from their depredations. If unmolested they seem to prefer the domestic stock where it is abundant and easily accessible, but, if a supply of beef can not be obtained, they readily take to the game trails and will hunt successfully either in the woods or in the open. It is to be hoped that their abundance can be controlled and their presence in the park practically eliminated before many years.

NORTHERN COYOTE: *Canis latrans* Say.—The big, northern, brown coyote seems to be the predominant species in the mountains of Glacier Park, but it is not improbable that the smaller, paler *nebracensis* enters at least the lower, more open valleys on the east. As no specimens are available from the park or immediate vicinity, the determination of the form must rest upon the large size and dark color of the individuals seen in the park. They are surprisingly common in the elevated interior, where their tracks and signs were daily seen along the trails, over the passes, and even along sheep and goat trails above timberline. One seen on July 31 picking its way over the rocks across the lower end of Blackfeet Glacier was in the thin summer coat of dark grizzled brown, but was not thin and skinny as summer individuals usually are. He looked plump and well fed and was so large that I looked closely to see if he were not a wolf. The tracks seen along the trails, about Gunsight Lake, in Piegan Pass, along the Swiftcurrent Creek, both forks of Kennedy Creek, the Belly River valley, about Elizabeth and Glenn Lakes, in the Waterton Lake valley, the whole length of the North Fork Valley, about Lake McDonald, and over Kootenai Pass and Flat Top Mountain were generally large. Along the side of Gable Mountain a track had followed sheep trails over the snow banks for several miles. In other places the animals followed the trails for long distances through heavy timber, where they seemed to be as much at home as in the open above or below timberline.

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Along the higher trails their sign was almost entirely of goat wool and sheep hair, showing what had been their principal prey, but in some cases deer hair was also detected, and in the valleys it was the main refuse from their food. In places where their tracks were most abundant the sheep and goats were usually scarce, and evidently the almost inaccessible cliffs to which these animals resort during the daytime are their only protection from constant attacks of the coyotes. In the evening both the sheep and goats come down into the little alpine meadows to feed, and if not constantly harassed they would undoubtedly remain at much lower levels during the daytime than at present, when they would be of more general interest to the tourists. Their only safety seems to be in getting on the narrowest, most elevated shelves of the cliffs, where pursuit would be difficult and dangerous, and where the naked rocks are too rough and sharp for the hoofless feet of carnivores. To save their feet the coyotes keep very largely along the trails or in the meadows where the ground is soft, and for this reason they are easily trapped. I was told that last winter one trapper caught 22 on Flat Top Mountain where they pass over from the Waterton to the McDonald Creek valley. It would not be difficult for one or two reliable and skillful trappers, kept on the job throughout the year, to keep the number of coyotes in the park to a practically harmless minimum.

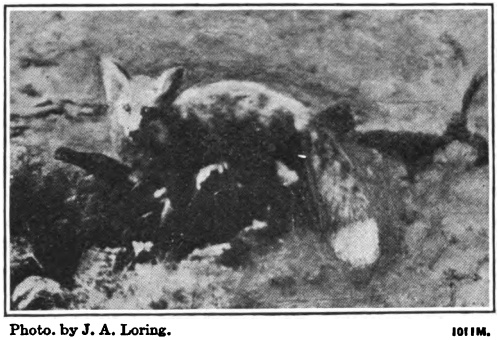

Photo. by J. A. Loring. 10118.

FIG. 15.—Mountain red fox in Wind River Mountains, Wyoming.

MOUNTAIN RED FOX: *Vulpes fulva macroura* Baird.—The mountain red or cross foxes are occasionally seen in Glacier Park, and in all their various color phases can be readily recognized by the large white tips of the bushy tails. They vary in color from the yellow red to a very much darker yellowish brown, with often a pronounced dark stripe across the shoulders, which gives this phase the name of cross fox. J. E. Lewis, at Lake McDonald, had some skins of the pure red, but more of varying shades of cross, and one that was showing the white tips on a very dark underfur that would have been classed as a silver-gray, except for a little rusty on the sides of the neck and flanks. I could get no record of the pure black fox from the park area, but this fully melanistic phase is so rare that very few are taken anywhere in the Rocky Mountain region. All

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the grades of color comprise but a single species or subspecies of the red fox group.

In 1895 Hank Norris told me that there were a few red foxes about St. Mary Lake, and Don Stevenson caught a pair on Swiftcurrent Creek in 1903 and says that old trappers reported them abundant in the eighties. In July, 1917, one was seen near Piegan Pass, and they are reported by Gibb as fairly common in the open along the crest of the range. In their favorite haunts on Hudsonian Zone meadows and open slopes, ground squirrels, mice, and birds supply them with abundant food, and among the broken rocks safe dens are always available. Their slender tracks in the trails and occasionally the sharp fox bark are the usual indications of their presence, except as one of the animals may be seen gliding lightly across the meadows. While it is probable that they get some ptarmigan and grouse, their numbers are so well kept down by the trappers around the borders of the park that they are not likely to be a serious menace even to the small game of the region.

Kit Fox; Swift: *Vulpes velox hebes* Merriam.—These little buffy gray foxes with black tips to the tails are common over the Plains along the eastern edge of the park, and undoubtedly enter its present borders in the open area at the lower end of St. Mary Lake and in the Swiftcurrent and Belly River valleys, but there seems to be no positive record of their having been seen or taken within the park boundaries. They are shy animals, not often seen even where most common, but wherever they occur their tiny doglike tracks may be found along dusty trails, and on rare occasions one may be seen gliding through the prairie grass with light, graceful, rapid motions, which have given them their common name of swift.

Family MUSTELIDÆ: Otters, Martens, Minks, Weasels, etc.

Otter: *Lutra canadensis canadensis* Schreber.—Otters are said to be fairly common along many of the streams in the park, especially on the west slope and in the north fork of Flathead Valley. Donald Stevenson reports them on Swiftcurrent Creek and St. Mary River, and in 1895 I was told that there were a few at Red Eagle Lake. Ranger Gibb reports them at Two Medicine Lake, on McDonald Lake, and other localities in the North Fork Valley. Before the Glacier Park was set aside otter skins were a small but important part of the winter's catch of the trappers in this region, and some very choice skins were obtained.

While swimming in the water of the lakes or streams, where they are most likely to be seen, otters may be recognized by their long and slender bodies and rapid, graceful motions. Except the beaver and muskrat, they are more perfectly adapted to life in the water

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than any other fur bearers of the region. Their long, tapering, and powerfully muscular tails serve as propellers as well as rudders, and the animals glide through the water with great swiftness and an almost serpentine grace that distinguishes them even at a distance from the heavy-bodied beaver. Their dark glossy brown fur has put a high price on their heads and nowhere are they at present found in any great abundance.

MINK: *Lutreola vison energumenos* (Bangs).—Minks are fairly common along the streams and lake shores in the park, but nowhere numerous, as their numbers are kept down by persistent trapping. A few tracks were seen along the banks of Belly River, Two Medicine Creek, and shores of St. Mary, Kintla, and McDonald Lakes. Ranger Gibb reports them along most of the streams and Donald Stevenson says they are especially common along the streams where fish abound. J. E. Lewis, at Lake McDonald, had skins from that general region

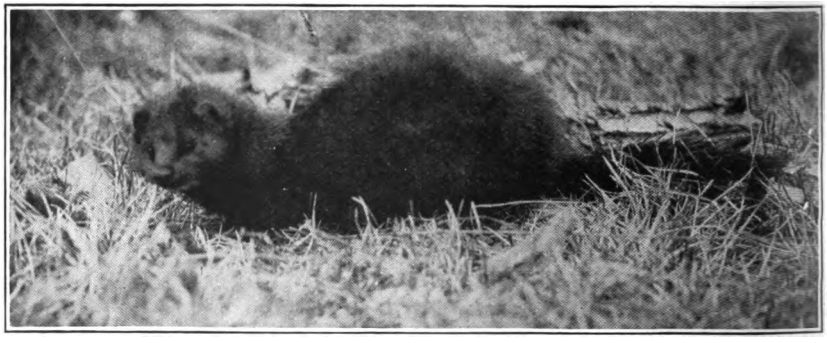

FIG. 16.—Mink photographed at old cabin above Kintla Lake.

that showed good color and excellent fur, and says that they constitute an important part of the fur catch of the region each year.

Minks are rarely seen except as caught in traps, but occasionally one gets a glimpse of a little dark brown animal with fuzzy tail darting along the creek banks or loping with arched back along the lake shore or swimming rapidly in the stream or lake. They are generally found in the vicinity of water, where much of their hunting is done. Their food consists mainly of mice and other small rodents, birds, birds' eggs, frogs, and fish. Of small game they occasionally kill muskrats, ducks, and probably grouse. At what appeared to be a breeding den at an old muskrat burrow on Lower Waterton Lake duck feathers were scattered thickly about the burrows, while at one side was a large heap of characteristic mink sign, composed also largely of feathers and bones of water birds. A family of mink on the breeding grounds of water birds is always a serious drain on the bird life, and it is fortunate that they are not abundant and that their attrac-

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FIG. 1.—FISHER. PHOTOGRAPH OF A CAPTIVE INDIVIDUAL IN NATIONAL ZOOLOGICAL PARK.

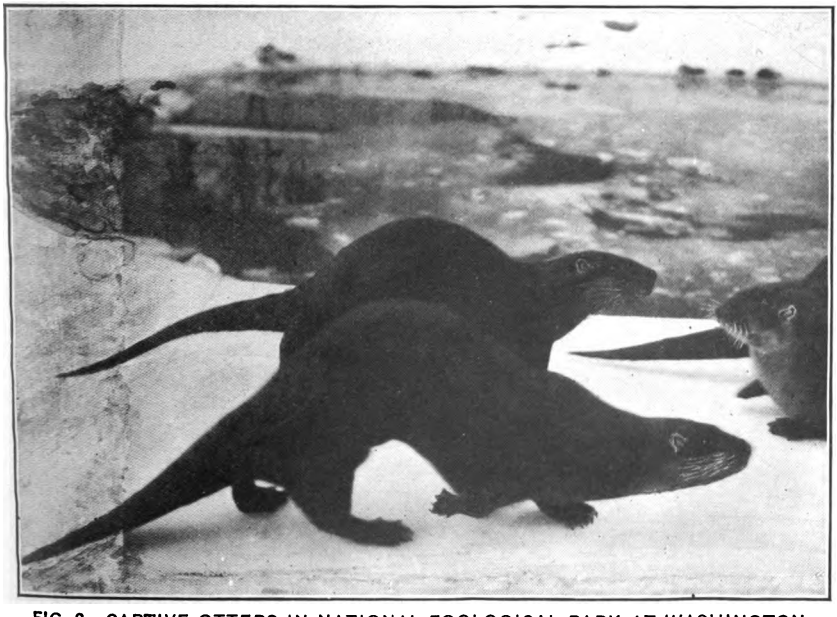

FIG. 2.—CAPTIVE OTTERS IN NATIONAL ZOOLOGICAL PARK AT WASHINGTON, D. C.

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tive fur puts a high value on their skins. Their destruction of fish is apparently not serious, although they feed quite extensively upon minnows and small fish, which they catch alive, but it is probable that the larger fish caught are the sick or injured individuals.

ARIZONA WEASEL: *Mustela arizonensis* (Mearns).—These are medium sized weasels with buffy brown backs and white lowerparts in summer, but in winter pure white, except the tip of the tail, which is at all seasons black. They are probably the commonest weasel throughout the park and may be found at all altitudes and in all kinds of country from the deep woods to the open meadows and bare slopes above timberline. In June, 1895, I caught one on a log over a creek at St. Mary Lake. They are great hunters and wanderers and seem to be incessantly chasing over logs and under brush, through rock piles, and from burrow to burrow and nest to nest of the small game which they pursue. Apparently they have no choice of day or night for hunting, but simply hunt until their appetites are satisfied and then keep on hunting for the pleasure of killing. Ground squirrels, chipmunks, mice, and all small rodents are at once thrown into a panic when a weasel appears on the slope, and with loud calls warn each other as far as possible in advance of a dangerous enemy. Even the pocket gopher in his tunnels underground is not safe if an open door can be found or an entrance forced into his galleries. He is relentlessly followed up and quickly dispatched and devoured and often his burrow is used as a temporary residence while the other rodents in the vicinity are being killed and eaten, or killed and left uneaten. Any thing of the weasel's own size or even considerably larger is fair game, but I have never known of this species killing the snowshoe rabbit. The conies are greatly excited by the appearance of a weasel, and many of the colonies that seem to have disappeared were probably exterminated by weasels, which readily follow their runways under the rocks and give them no chance of escape. In winter their tracks are seen in long zigzag lines over the snow, or they disappear at a round burrow which has been forced down through the snow to the surface of the ground, where mice and squirrels and pocket gophers have their runways and can be followed up and caught. The pure white winter coats, however, have a market value, and great numbers of weasels are caught in the lines of traps set for minks and martens and more valuable game. While not sufficiently large and long furred to be as valuable as the Old World ermine, their pure white skins are extensively used for furs.

LONG-TAILED WEASEL: *Mustela longicauda longicauda* Bonaparte.—These large, long-tailed, yellow-bellied weasels also are buffy brown in summer and pure white in winter, except for a usual sulphur-colored stain over the belly and the long black tip of the tail.

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They are common over the Plains along the eastern edge of the Glacier Park and apparently extend up in the open tongues of prairie which follow up the valleys. Two specimens collected by Coues in 1877 at Chief Mountain Lake (Waterton Lake) were in or close to the edge of the park, and one collected by Ernest Thompson Seton on Eagle Creek has been listed as this species. In May, 1895, I collected an adult female on Cut Bank Creek below the park line, and in August, 1917, I found one dead by the trail between Upper and Lower Waterton Lakes. These large weasels are closely associated with the flickertail, or Richardson ground squirrel, over much of their range. At Cut Bank Creek I shot one that was running from one burrow to another in pursuit of these squirrels and after some digging found it dead curled up in the nest of the squirrel at the far end of the burrow. Mice and other small rodents probably furnish much of their food, but the ground squirrels and especially the young are easily obtained and apparently relished by the weasels. The weasels are never abundant, however, and the squirrels thrive in spite of the numbers destroyed. Possibly some small game and birds may be killed by them, but as a general thing they may be considered very useful animals. In winter their white skins have some value for fur, but the yellow suffusion usually renders them less valuable than the species with pure white fur.

BONAPARTE WEASEL: *Mustela cicognanii cicognanii* Bonaparte.—A very small weasel is reported in the Glacier Park which probably is this species, but no specimens are available for actual determination. Donald Stevenson reports them apparently fully adult and in the white winter coats, but only eight inches long, including the black tip of the tail. This could hardly be any other species, unless it can be referred to the still smaller *leptus* of the southern Rocky Mountains. Usually these little weasels are less common than the larger species, or else from their small size they more generally escape notice. They range at all altitudes through the mountains and feed mainly upon mice, which they readily follow through the runways and burrows. In summer they are brown above and white below and in winter pure white except the black tip of the tail, but their skins are so small as to be of little value, and perhaps owing to their small size they are not so often caught in steel traps set for larger game.

MARTEN: *Martes americana caurina* (Merriam).—The marten is about the size of a mink, but with longer, lighter fur and more prominent ears, which in the wild state give them a much brighter, more foxlike expression. Their furry coats vary from light yellow to dark brown with lighter or sometimes bright orange throat and belly. They are probably as common in the park as anywhere in the country, but no animal with the price on its skin that they have

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long maintained could well be numerous or very common. For at least half a century the park region has been famous for the number of martens caught each year by trappers. In 1895 old and fresh marten traps and old trapper cabins were common throughout the area where the park now lies, and lines of blazed trees that once marked trap lines may still be found through the most remote and heavily wooded sections of the park. The animals are reported to be more common on the west slope of the mountains than on the east, but this is probably because the timber there is more dense and extensive and it has not been possible to trap them out so thoroughly.

Martens are forest animals, keeping usually in the heavy timber, where they hunt from tree to tree and over and under logs and brush for their prey. They are expert climbers, and if seen at all in the woods are most likely to be seen in the trees. When startled they usually take refuge in a tree and may thus attract attention by the noise they make in climbing. At McDonald Lake in August, 1917, while picking my way through the underbrush, several ruffed grouse started up with a roar of wings, and from close to the spot a marten rushed up the trunk of a small cottonwood tree. He was so close to the grouse that he had evidently been stalking or lying in wait for them, but when I flushed the flock he also took alarm and made a rather noisy escape. When up 30 or 40 feet from the ground he seemed to consider himself safe and sat on a branch watching me with keen interest. To further test his climbing powers I climbed the tree to within a few feet of him, when he became greatly alarmed and made a long jump to the branches of the next tree. By swinging my tree as far as possible I was able to catch one of the branches of the tree he was in, and by quick jerks shook the tree until he became still more alarmed and made a flying leap for the ground, about 40 feet below, where he struck lightly and, bounding away through the woods, was soon lost to sight and sound.

Donald Stevenson, who has spent many winters in trapping them, states that the principal food of martens is snowshoe rabbits and pine squirrels, but they also catch mice, wood rats, and conies, and undoubtedly a good many birds. The scarcity of grouse in a good marten country is easily interpreted. Rabbits, squirrels, and birds are mostly used for trap bait, and the traps are set in a little pen covered to keep out the snow, or on the top of a stump with a shelter or on a little shelf on the side of a tree above which the bait is suspended. Steel traps are generally employed, but many deadfalls of the ordinary type are used and some are made with the butt end of a small tree boxed into the top of its stump with a figure 4 underneath. Martens are as a rule unsuspicious and easily caught wherever they occur. Their abundance in the park would tend to keep down other small animal life, especially the squirrels and grouse,

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which furnish important features of interest. A few would do no serious harm, but the delicate balance of species is not easily maintained by hard and fast laws of man. Special permits to reliable parties for trapping them in the park during a limited season when they become too numerous would probably control their numbers here, while outside the park there is no danger of their ever becoming too abundant.

FISHER: *Martes pennanti* (Erxleben).—The fisher is many times larger than the marten, with long coarse fur of a black or dark gray color. Although ranging entirely across southern Canada, it is at present a rare animal in any part of the United States. A few are reported in the park, where they are likely to hold their own and through proper protection maintain a remnant of the species for a long time to come. In many years of trapping in the park region in the early days, Walter S. Gibb has caught three of these animals, but some of the old trappers have not secured a skin. Donald Stevenson reports two skins that were taken by trappers on the Upper Swiftcurrent in 1910, and tracks which he saw on Swan River and South Fork as late as 1912.

In habits these animals are much like the marten, hunting through the forest country for rabbits, squirrels, and grouse, and ranging over a wide territory. They are expert climbers and are said to pursue their prey even through the tree tops in long leaps from tree to tree. Their fur is heavy and soft and overlaid with rather coarse but glossy hairs that render it durable and attractive. It ranks as one of the more valuable furs, partly from its intrinsic qualities and partly from its rarity.

WOLVERINE: *Gulo luscus* (Linnæus).—The wolverine is a sturdy, heavy-bodied animal, with short bushy tail, long coarse hair, and a unique pattern of brown and black, with a yellow band over back and sides. It is the largest of our weasel tribe and has the reputation of being a fierce little beast, ready to fight anything of its own size or many times larger.

In 1895 I was told by trappers at St. Mary Lake and over the range that there were a few in the region and occasionally one was caught. Ranger Gibb reports a few trapped each year before the park was created, and Stevenson reports one killed by his father on Kennedy Creek in 1902 and tracks seen above St. Mary Lake in 1910. Gird told me of one killed in the Kintla Lake region a few years ago, but Lewis thinks there are none left in the park at present. They are great wanderers, however, and in this forested region one is likely to appear at any time from some neighboring range.

With their short legs and heavy build they are not expert in the pursuit of live game and to a great extent are scavengers and rob-

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bers. They often follow the trap lines, breaking up the trap pens and eating the bait without getting caught, or when caught in small traps breaking the traps and so going free with an experience that is valuable to them later in keeping out of other larger traps. They travel long distances in search of any dead, sick, or crippled animal, and they have the reputation of feeding even upon the porcupine.

Their long, coarse fur, when in prime condition, makes up into beautiful robes and coats and brings a high price in the fur market. It is very durable and has a beauty and individuality which give it a high rank.

NORTHERN SKUNK: *Mephitis hudsonica* Richardson.—The large northern skunks are common in many places in the lower levels of the park. They belong to the Transition Zone, but at times wander slightly beyond its borders. At Many Glacier and about Lake McDonald they are fairly common, and tracks were seen near St. Mary Lake, and in 1895 a specimen was collected at Nyack, a little station on the Great Northern Railroad between the summit of the range and Belton. They are not sufficiently numerous to be troublesome, and I did not detect their powerful odor at any place in the park. They are harmless and interesting animals, except on rare occasions when they find convenient quarters under camps or cabins and on being disturbed make themselves offensive. Whenever they become objectionable they may easily be caught in box traps and carried to a safe distance for release or be dispatched if necessary.

Skunks make much of their food of insects, mice, and any small rodents that they can dig out of the ground or capture by their slow methods. They are fond also of berries or any sweet fruit and find much to their taste in the garbage piles or refuse thrown out from camps and hotels. In autumn they become very fat, and about the time the ground begins to freeze enter their deep burrows and curl up for a long winter sleep. Their fur is at its best just before they enter upon or after they emerge from hibernation, and, while not high-priced, it often forms an important part of the trappers' catch in the low country.

BADGER: *Taxidea taxus* (Schreber).—Badgers are common over the Plains country along the eastern border of the park, and if they enter the present park boundaries at all it is only in the open areas in its eastern valleys. Apparently they are entirely absent from the timber or mountainous area. In 1895 I reported them as common at the lower end of St. Mary Lake, but in 1917 could find no trace of even their burrows inside of the park line. Ranger Gibb says that he has never seen them in the park. They certainly are not a common animal within its borders.

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Out over the Plains they spend most of their time digging out the burrows of the flickertail, or Richardson ground squirrel, and feasting upon the fat occupants. While thus engaged in doing the greatest possible service to the ranchmen they are killed on every possible occasion, because their big burrows on the prairie are a menace to horse and rider. They are also trapped to some extent for their fur, which in this northern climate becomes very long and is in considerable demand for clothing. Meanwhile the ground squirrels, in unchecked abundance, destroy the crops and forage until the country becomes sufficiently populous and prosperous for them to be systematically destroyed by artificial means. In autumn badgers become very fat, and before the ground is frozen too far down they dig deep burrows, in which they barricade themselves for a long winter's hibernation.

Family URSIDÆ: Bears.

BLACK BEAR; CINNAMON BEAR: *Ursus americanus* Pallas.—Black and brown bears are found over practically all of Glacier Park, and at various seasons range from the lowest levels to above timberline. During July and August of 1917 they were most abundant in the valley bottoms, where the many ripening berries had attracted them. Their tracks and signs were seen along the trails and roads at St. Mary Lake, in the Swiftcurrent, Belly River, and Waterton Valleys, at the lower ends of Gunsight and Ellen Wilson Lakes, and about Granite Park. During the last week in August bears were especially common about Lake McDonald, and they are said to be numerous throughout the valley of the North Fork of Flathead River. They are not restricted to any life zone, as their search for food throughout the season carries them back and forth from above timberline to the lowest valleys and even out along the streams into the Plains country. In a single night a bear may pass through all of the zones on one slope of the mountains and over the top and down the other side without making an unusually long journey. Often their tracks will be found following a trail for miles until they branch off on some other trail that will be followed in turn for many more miles.

An old brown bear with two cubs was seen between Belly River and Waterton Lake on August 14, and a small black bear came to our camp one night in the Waterton Valley and carried off a ham from one of the pack sacks. At Lake McDonald late in August an old bear and two large cubs were feeding at the garbage pile back of Lewis's Hotel, but another bear that claimed some of the garbage caused the mother much anxiety for the safety of her cubs, and she kept chasing him away. Every time she charged the other

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bear the cubs rushed up the nearest tree and remained until the coast was clear and quiet again prevailed, when they would come down and very cautiously approach the garbage; but usually before they reached the heap of tin cans another *w-o-o-f* of the mother in pursuit of the stranger would again send them up the nearest tree. The mother seemed anxious to have them get their share of the food, and as soon as she had chased the intruder out of sight she would come back to their tree and scratch on the trunk, when the young would come down slowly and cautiously. During the half hour in which we watched them they did not reach the food supply, but probably succeeded in getting some of it later in the evening. A little earlier there were said to be six bears at the garbage pile at one time, including one brown, but some of them were not very tame and left as soon as the tourists began to appear. The next day on the shore of a little pond in the woods near Lake McDonald we heard a twig snap and soon saw a medium-sized black bear feeding on the service-berries only 20 or 30 yards away. He was so eager for the berries that he did not notice us and went on eating the ripe, sweet fruit hanging in luscious bunches from the bushes. He would stand up straight on his hind feet and with both hands pull down branches of the bushes and pick off the big purple berries with his lips and tongue. After stripping one bush he waded into a small pond, across which he swam and went off through the woods, making for a bear an unusual amount of noise and crackling. He was probably one of the garbage-pile bears which had lost some of his caution in finding that man was after all a harmless animal.

The story of the food of these bears gives most of their life history. The old droppings of early spring showed a ravenous appetite that was often appeased by dry grass, pine needles, bits of rotten wood, and bark that had been gathered up with a few ants, beetles, and larvæ that served to fill up and furnish a little nutriment. An occasional feast on the carcass of some animal that has died or has been killed during the winter helps out at this time of year, and the left-over supply of winter fat helps carry them through the early spring-time. As soon as vegetation starts a great variety of green plants are eaten, and as the frost leaves the warm slopes many roots and bulbs are dug up for food. The great yellow-flowered western dog-tooth violets grow in profusion throughout the Canadian and Hudsonian Zones, and as they begin to come up and blossom at the lower levels the bears dig the tender starchy bulbs in great numbers for food. As they blossom soon after the snow has disappeared, there is a continuous zone of the flowers creeping up the sides of the mountains from May at the lower levels to late in August near timberline. In the latter half of July they were at their best in the Hudsonian

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Zone, where acres of the brilliant yellow lilies covered many of the open slopes between the groves of white-barked pines. Here the bears were reveling in a feast of the juicy bulbs. Near Granite Park, in numerous places over the mountain sides, they had torn up the sod in areas of a few yards to several square rods in extent, tearing it up continuously from the edge and turning out the bulbs 4 or 5 inches below the surface and rolling the sod back, first one way and then another, until the ground had the appearance of having been plowed. On both sides of Gunsight Pass, at the lower edge of Blackfeet Glacier, on Flat Top Mountain, and at Elizabeth Lake extensive areas were found plowed over by the bears for these bulbs, each one of which, the size of a small onion and much more palatable, would make a pleasant mouthful.

Probably these bears obtain many other bulbs and roots and some insects and larvæ while digging for these bulbs. At times even late in summer large quantities of green vegetation are eaten, as shown by the sign, but the particular species of plants are not easily recognized. The tender young flower stalks of the bear grass (*Xerophyllum tenax*) are eaten to some extent, but as the blossoms begin to develop they soon become tough and hard. Some of the white, tender mountain thistles had been cut off, evidently by bears, and the cow parsnip (*Heracleum lanatum*) had been eaten while young and tender. On the west slope of the mountains and in Waterton Valley many trees had been peeled near the base for the layer of sweet cambium underneath the bark. A mouthful of bark had been bitten loose near the ground and pulled off as high as it would strip from the trunk of a tree, and then another and another until a considerable area of the trunk was left bare. In midsummer this growing wood is covered with a layer of soft gelatinous tissue that later hardens into the annual growth of wood, but at this time is sweet and nutritious. With the lower incisors the bears scrape the wood upward and thus scoop into their mouths the soft cambium layer and apparently get a good square meal from the trunk of a tree peeled halfway around and as high as they can conveniently reach. Hundreds of trees may be found that have thus furnished meals to the bears. The lodgepole pine and Engelmann spruce were the species usually chosen, but some white-barked pines had been peeled, and on the west slope the tamarack (*Larix occidentalis*) seemed to furnish the favorite bear food; even as late as the last of August it had a pleasant flavor. Most of the trees, however, were peeled in midsummer, when the cambium was at its best. During August the bears were feeding extensively on berries and fruit, of which they obtained a considerable variety. The little red blueberries were scarce in 1917, but in places a few were found and stripped off, leaves and all, to make them go as far as possible. The abundant little red bear-

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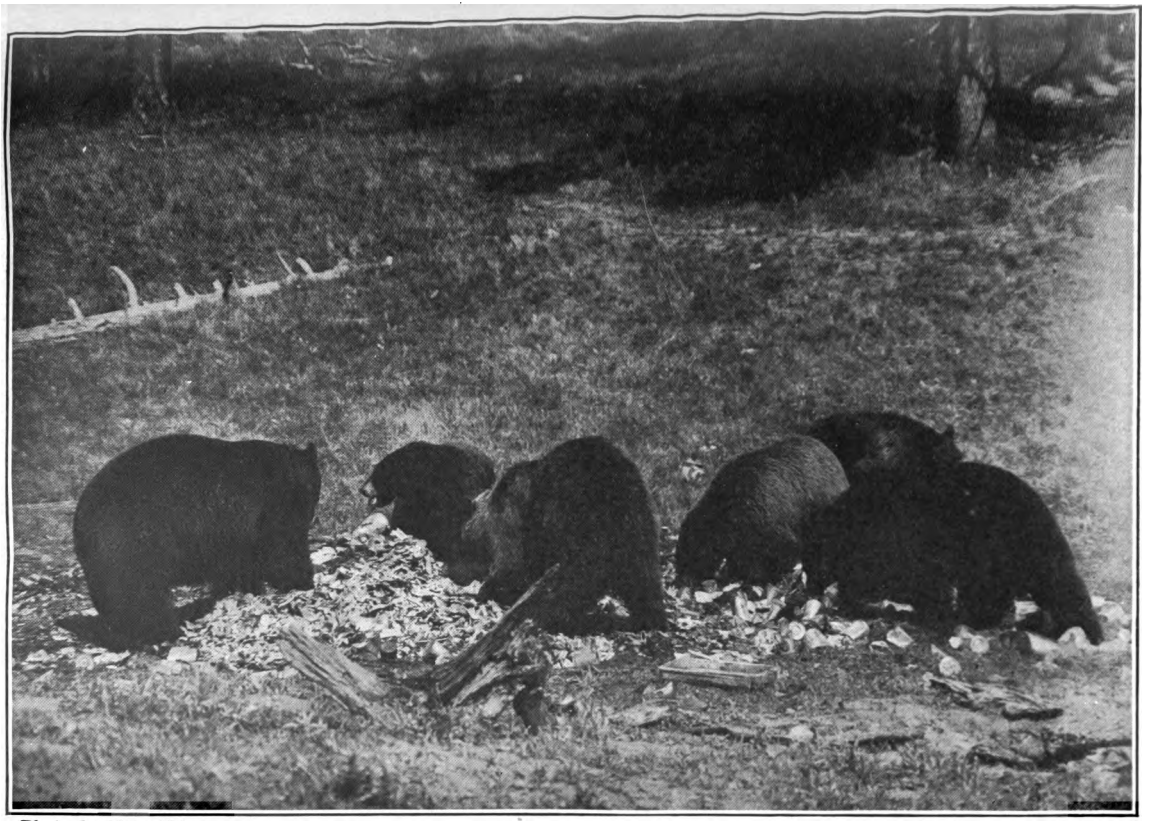

Photo. by M. P. Skinner.

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BLACK BEARS AT GARBAGE PILE IN YELLOWSTONE PARK.

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FIG. 1.—OVERTURNED TURF WHERE BULBS OF DOG-TOOTH VIOLETS HAVE BEEN DUG OUT BY BEARS NEAR GRANITE PARK, JULY 18, 1917.

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FIG. 2.—BURROW AND NEST OF COLUMBIA GROUND SQUIRREL DUG OUT BY BEARS NEAR GRANITE PARK.

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berry (*Arctostaphylos uva-ursi*), which occurs in carpets over the ground and is usually loaded with dry, mealy berries, is extensively eaten, but the favorite food of the bears is the serviceberry (*Amelanchier alnifolia*), which is especially abundant and prolific on the west slope. Some berries of the mountain ash were sought for, but these were only beginning to ripen the last of August. Thorn apples (*Cratægus douglasi*) furnish an abundance of sweet, purple fruit on the west slope, and raspberries, thimbleberries, currants, and gooseberries all contribute to the summer food.

Great numbers of the burrows of the little, fat ground squirrels (*Citellus columbianus*) are excavated by bears, and apparently the occupants contribute an important article of food. A few of these burrows are dug out during the summer, but probably more of them late in fall after the squirrels have become very fat and hibernated and after other bear food has become scarce. In the vicinity of Granite Park I found dozens of these burrows that had been torn open through the tough sod and stones, and even small trees were thrown out in getting to the bottom of the burrow, where, 2 or 3 feet down, the soft grassy nest had been reached and its remains left scattered about. As the squirrels hibernate at least a month before the bears do, they evidently are a great help in enabling the bears to lay in sufficient fat for their winter's store.

There is no evidence that the bears molest any large game, and the scouts and old hunters and trappers say that they do not. As they are great scavengers, and quickly locate dead animals, they are trapped mainly by the use of meat bait. In this way great numbers of game animals have been destroyed by trappers for bear bait, and as late as June 22 I have found bear traps baited with freshly killed deer and goats. Moose and elk have also suffered severely in this way before the Glacier Park was created and put under proper supervision.

As the establishment of Glacier Park was comparatively recent, the bears have not yet gathered about hotel and camp garbage piles as they do in Yellowstone Park, but they will soon learn, and under proper management of the garbage they can be made a perfectly safe and very attractive feature of the animal life of the park. A place for the garbage might be selected in the open, close to the edge of the woods, but where the bears can be plainly seen and readily photographed, and where no one would accidentally come upon them unnoticed at very close quarters; then a tourist-proof fence could be erected in a semicircle at a safe distance around the open side of the garbage. This would not only allow the bears to have some peace and quiet in which to enjoy their meals and enable the visitors to watch them at reasonably close range, but would prevent interference with the bears by the few foolhardy visitors who do not realize that

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a bear, while a most respectful and dignified animal, has not unlimited patience and is capable of resenting with fatal results any undue familiarity. Only those who are familiar with them throughout the season should be allowed to feed or take any liberties with them.

GRIZZLY BEAR; SILVERTIP: *Ursus horribilis imperator?*[1] Merriam.—During the summer of 1917 a few grizzly bears were reported in the less frequented areas of the park, and a few are said to have been killed around the edges each year. They are very shy and few have learned to come to the hotel garbage piles. One visited our camp at the Reynolds Cabin, in the Upper Waterton Valley, one night in August, but quickly left when he found the cabin occupied, and the cook and guide were the only ones to get a glimpse of him. In the spring of 1895 they were the commonest bears in the St. Mary Lake region, and their great tracks were seen on the snow along the trails every time we climbed the mountains. One day in May, 1895, as Howell and I came down the mountain we saw one splendid silvery gray fellow in a little park close to the edge of the thick timber. He was evidently digging bulbs or hunting for mice or insects, but was too far away for our short-range guns, and our shots only sent him quickly into the woods. On June 3, as Hank Norris and I were watching a drove of white goats on the side of Going-to-the-Sun Mountain, we saw an old bear and small cub going down across the glacier into the bottom of the valley. We quietly slid down the side of the mountain and tried to head her off as she made for a piece of timber below, but seeing or hearing us she turned up the opposite slope and beat us to the top of the range by nearly a mile. We sat on the snow and watched her and her cub climb the slope and disappear over the crest of the ridge. The cub was about the size of a raccoon and could not travel very fast, but the old bear kept only a little ahead of him and anxiously coaxed him along as fast as possible, looking back and encouraging him to follow her at the best speed he could make. The track made by the hind foot of this old bear measured 6 inches across the ball of the foot and 11 inches long where it made the full print in the snow.

As we returned down the canyon between Going-to-the-Sun and Goat Mountains we found where a still larger bear had followed the

[1] At least two and probably three species of grizzly bears occur in the Glacier Park region, as even the trappers have long recognized. Donald Stevenson, who lived for many years on Swiftcurrent Creek and trapped and hunted in the region before it was a park, tells me that some are nearly black in color, with white tips to the hairs of the face and sides; some are a rusty brown; and others a golden yellow along the sides. Sufficient skulls have not been obtained to determine satisfactorily the species occupying the region, and there are still fewer skins to go with these skulls to show which color pattern belongs to each of the different species. The habit notes are also generalized under one heading, so that it is impossible to separate them or tell whether the range and habits of the different forms vary as do the cranial and external characters.

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Photo. by M. P. Skinner. B1006M

GRIZZLY BEARS IN YELLOWSTONE PARK NEAR CANYON HOTEL.

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track of a white goat across the snow bank until he struck the trail we had made in going up the canyon four hours earlier. He had left the goat track and followed our trail, but in the wrong direction—down the mountain instead of up—so we did not see him. A few days later while on Flat Top Mountain I found where an old grizzly and two cubs had been eating a mountain sheep up near timberline. The tracks were not a day old, and the sheep had been entirely eaten, except a few pieces of skin and bits of bone. While the snow was bloody and much trampled, there was no indication that the sheep had been killed by these bears. More probably it had been shot by hunters or killed and partly eaten by mountain lions or wolves and then finished by the bears, which could not well have caught an able-bodied mountain sheep on its own rocky slopes or on deep, well-crusted snow. Throughout the forest in this region the bear tracks, beds, and signs were abundant at the lower levels. Most of the sign was composed of the remains of various green plants. Near timberline on the warm slope of Flat Top Mountain the cones under the white-barked pine trees had been chewed up as though by hogs. This was undoubtedly the work of bears in shelling out the pine seeds or nuts, of which they are especially fond. It was evidently done during the previous fall while the squirrels were getting the cones for their winter stores.

From the early eighties to the time when Glacier Park was created, in 1910, this was one of the most popular regions for hunting grizzly bears in the whole United States, and many were killed each year by sportsmen, and others were caught by the numerous trappers of the region. In 1895 I found lines of bear traps between Summit and Belton up to late in June. Even then some of the trappers who were thoroughly familiar with the methods of killing large game for bear bait considered bear trapping the greatest menace to the game of that region. Traps were baited with mountain sheep, goats, and deer, and I was told that at least 500 elk and moose were killed every year for bear bait. Most of the trapping was done in spring, when the bears first came out of hibernation and the fur was at its longest and best. As they enter their dens for the winter hibernation with the first cold weather and deep snows, usually in late October or early November, and do not reappear until early in April, the time for securing their skins in prime condition is short at either end of the season.

Order INSECTIVORA: Insect Eaters.

Family SORICIDÆ: Shrews.

WATER SHREW: *Neosorex navigator navigator* Baird.—The large, long-tailed, velvety, black-backed and white-bellied water shrews are

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the largest of their family in the Rocky Mountain region. Adults measure, in millimeters: Total length, about 148; tail, 71; hind foot, 20 or 21. With their long, flexible noses, minute eyes, and inconspicuous ears they are typical of this family of insect eaters; but, unlike the other members, they are highly specialized for life in the water. The hind feet are large, with fringed margins for swimming, and the long tail is evidently useful as a rudder. They are probably common and generally distributed over the park, as well as north and south and west of it. In 1895 specimens were taken at St. Mary Lake and along the railroad between Paola and Nyack, all in the vicinity of creeks, springs, or ponds in the Canadian Zone. The shrews are not often seen except when caught in traps, but on rare occasions one may be seen darting about in the water, over the surface or underneath, in search of its prey, as much at home as a seal or otter. They are less often seen on land, as they keep mainly under cover of logs, banks, or fallen vegetation, where they hunt for insects and any small animal life that comes in their way as food. Usually they are found not far from water and on wet ground or under damp logs or banks. Their stomachs are generally full of the finely chewed-up remains of insects and unidentifiable particles of small animals, and any kind of meat used as trap bait is eagerly taken. If a mouse has been caught in the trap before a shrew comes along, it is invariably partly, and sometimes wholly, eaten, and the shrew is generally caught if the trap is reset in the same place.

There has been much speculation as to whether the shrews catch small fish and eat fish eggs, and while there seems to be no positive evidence on the subject, they would doubtless do so if opportunity offered. Their skill and quickness in the water would certainly enable them to catch minnows and small fish, but fortunately they are not sufficiently abundant to do any serious harm. Any opportunity to study their habits in life should be followed up with great care, as the subject is one of importance as well as of general interest.

Dusky Shrew: *Sorex obscurus obscurus* Merriam.—These little dusky brown shrews, while only 110 to 115 millimeters in total length, with tail about 45 and hind foot 13, are the largest and apparently the commonest of the three species of little shrews occurring in the park. At St. Mary Lake, Howell and I caught nine specimens in May and June, 1895, and in 1917 I collected specimens in the park at Many Glacier and at Wall Lake, British Columbia, close to the northern line. They are generally caught in traps set for other mice under logs or rocks, or in holes, creek banks, and runways through the meadow grass. Tiny roadways are found under the surface layer of leaves and fallen vegetation, where the shrews run through their covered galleries from burrow to burrow or follow the trails of meadow mice and other species through the grass and weeds. They

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are active both night and day and probably depend more on the sense of touch in the long flexible nose than on the vision of minute and almost invisible eyes. In pursuit of insect and other small forms of animal life, which constitute most of their food, they are energetic hunters, and are eager for any kind of meat that may be used for trap bait, never failing to tear and eat other mice that are caught in traps. To what extent they kill the young or adults of other mice is not known, but they are savage little animals, perfectly capable of killing rodents much larger than themselves.

An old female collected at St. Mary Lake on June 1 contained eight small embryos, but this was probably an unusually large number, as her mammæ were only six, arranged in three pairs close together. Apparently none of the shrews become fat or hibernate in winter, and their tiny tracks may often be seen over the surface of soft snow, into which they burrow and push their way from top to bottom with perfect freedom. They are as easily caught in winter as in summer, and a piece of frozen meat placed under a log in the woods for a few days will generally attract several shrews that eagerly gather to gnaw at it. Against cold and wet their dense fur seems to be at all times ample protection. While so tiny, they are vigorous and powerful animals for their size, with many interesting habits not well known or understood.

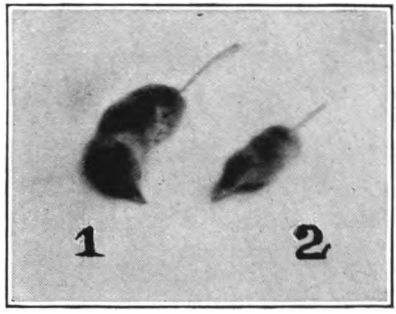

FIG. 17.—No. 1, dusky shrew; No. 2, masked shrew. (Photographed from alcoholic specimens.)

DOBSON SHREW: *Sorex vagrans dobsoni* Merriam.—These little brown shrews are scarcely distinguishable in the field from the dusky shrew, with which they are often found. While the teeth and skulls show well-marked characters, the size and color are so similar that a critical examination of the skulls is necessary to tell them apart. For this reason the habits of the two as collected in the field are rarely distinguished, and it is doubtful if they differ to any great extent, as all small shrews seem to be rather similar in habits. Two specimens collected at Summit Station in June, 1895, measured in millimeters: Total length, 110, 115; tail, 41, 45; hind foot, 13, 14. Another collected by Howell near Nyack measured: Total length, 108; tail, 44; hind foot, 14. These were caught in the woods under logs, fallen grass, and the drooping leaves of bear grass (*Xerophyllum tenax*). Those at Summit Station were on the north side of the railroad, actually within the present boundaries of the park; while the one near Nyack was taken on the opposite bank of the river just outside the park.

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MASKED SHREW: *Sorex personatus* I. Geoffroy St. Hilaire.—These are the smallest shrews in the park, adult specimens measuring in millimeters: Total length, approximately 100; tail, 40; hind foot, 12. In color they are plain sepia brown, slightly paler below, and very similar to both the dusky and the Dobson shrews in summer pelage. Their small size, however, usually serves to identify them in the field, but their habits apparently do not differ much from those of the other two species. In 1895 Howell and I collected three specimens at St. Mary Lake on the same ground with a larger series of the dusky shrew, and no difference in the habits of the two could be discovered. Another specimen collected at McDonald Lake and others in country surrounding the park would indicate a distribution over the whole park area in suitable situations. Generally they are forest dwellers, but may be found in meadows or along the streams and out in the prairie and Plains country, and while so minute as rarely to be noticed, they are probably much more common than is generally supposed.

Order CHIROPTERA: Winged Mammals.

Family VESPERTILIONIDÆ: Bats.

LONG-LEGGED BAT: *Myotis lucifugus longicrus* (True).—A small quick-flying brownish bat seen commonly about the hotel at Lake McDonald on still evenings in August was probably of this species, which Howell and I found abundant at Flathead Lake in 1895 and of which we collected a large series of specimens. None were collected in the park, as they were seen only while flying about the hotels. Evidently they had made their homes in dark corners and crevices of the buildings, from which they emerged at dusk to begin their evening flight in pursuit of winged insects. They circled rapidly about the buildings, under the piazzas, and occasionally through the open doors, and were seen also along the lake shore where they often dipped down to the surface of the water to drink. They are so strictly nocturnal that it is difficult to secure specimens, except by

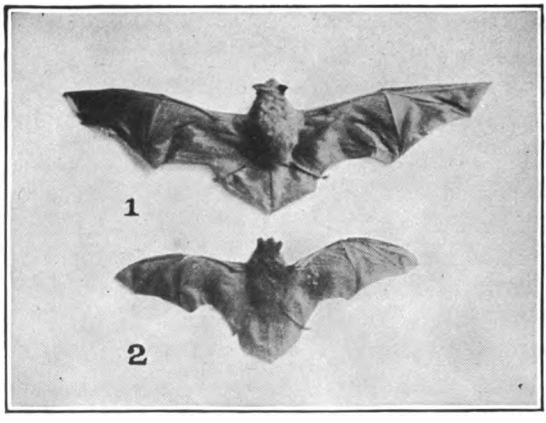

FIG. 18.—No. 1, brown bat; No. 2, long-legged bat. (Photographed from museum specimens.)

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shooting them on the wing when they first come out of their diurnal hiding places, and usually the light is so dim when they first appear that wing shooting is rendered difficult, and in most cases considerable ammunition is wasted for the few specimens secured. Occasionally one is caught in a room at night, or a hiding place is found where they may be secured from a crack or crevice as they hang head downward during the day. Specimens of these or any other bats in the park should be saved whenever possible, as it will be long before sufficient material is obtained to show all of the species inhabiting the area.

BROWN BAT: *Eptesicus fuscus fuscus* (Beauvois).—Large, brown, rapid-flying bats seen of evenings about the Many Glacier Hotel in mid-July were apparently of this species, but no specimens were obtained, owing to the danger in shooting around occupied buildings. Those seen were flying rapidly about the buildings and along the lake shore at early dusk, while it was still light enough to see color and to have easily secured them on the wing with a shotgun if shooting had been permissible. Evidently they are not very common in the park, as none were seen in other locations away from buildings, although the species often lives in hollow trees or under bark in the woods as well as in the dark spaces under eaves and cornices of buildings. They undoubtedly range over most of the park areas, but are rarely seen except near where they spend the day and as they first come out of their roosting places.

SILVER-HAIRED BAT. *Lasionycteris noctivagans* (LeConte).—A number of medium-sized very dark and rapid-flying bats seen over the hotel and among the trees at Lake McDonald, August 29, were evidently of this species. The silvery tipping of the black fur over the back could not be seen with the bats on the wing, but the size, rapid flight, and dark color are almost unmistakable characters with this species. The dense forests of the park present ideal conditions for these boreal, forest-loving bats, the loose bark on numerous dead trees affording favorite places in which to spend the daylight hours, and the forest-dwelling insects, their favorite food. I tore the bark from many old trees in the woods in the hope of securing specimens from underneath, but was not successful within the park area. If possible, specimens should be secured and preserved in order that positive records for the park may be obtained, as flight identification of bats is at best unsatisfactory.

HOARY BAT: *Nycteris cinerea* (Beauvois).—At Waterton Lake, near the north end of the park, at 11 o'clock in the morning of August 15, one of these big gray, short-eared bats was seen flying about in the bright sunlight over the water and back into the trees on the shore of the lake. It was watched for several minutes with the field glass and at such close range that, with its every mark and character plainly recog-

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nized, its identification was as unmistakable as if the specimen had been collected and preserved. While it flew freely and seemed perfectly at home in the bright light, it probably had been driven from its roost among the leaves of some cottonwood tree on the shore by the campers along the lake. These bats have rather large eyes, and their evening flight begins usually a little earlier in the dusk than that of most bats, but the habit of flying in broad daylight is certainly not common with them and probably means that they have been disturbed in their roosting places. Usually during the day they hang head downward in some dense cluster of leaves where well concealed, but where the light is not wholly excluded, as in the hiding places of most of our northern bats. While never abundant, they are a wide-ranging boreal species, breeding usually in the Canadian Zone and migrating southward in winter over practically the whole United States.

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THE BIRDS.

By Florence Merriam Bailey.

INTRODUCTORY.

I. ITINERARY AND ACKNOWLEDGMENTS.

The material for the basis of the accompanying report on the birds of Glacier Park was obtained during July and August, 1917, when in addition to the automobile trips from Glacier Park Hotel to Two Medicine, St. Mary, and Many Glaciers, and short trips to Grinnell Lake, Iceberg Lake, and Granite Park, a month's pack trip was made to the Canadian boundary and return. Starting from Going-to-the-Sun Camp we went to Lake Ellen Wilson, and by way of Piegan Pass to Many Glaciers and the Swiftcurrent Flats; thence northward through the Kennedy Creek and Belly River regions—visiting Crossley and Glenn Lakes—to the Lower Waterton Lake in Alberta. From Waterton Lake a side trip was made to the Boundary Mountains in British Columbia overlooking the Kintla Lake region, after which we returned by way of the Waterton Valley and the Kootenai Trail to Granite Park and Many Glaciers. A railroad trip to Belton and a week at Lake McDonald completed the season's work.

In the two months a general idea as to the breeding birds of the region was obtained. But additional material regarding the spring and fall migrants and winter residents has been procured from Dr. George Bird Grinnell's article entitled "Some Autumn Birds of the St. Mary Lakes Region," published in Forest and Stream in 1888; a manuscript report kindly submitted to me by Mr. A. H. Higginson, of Boston, on the winter birds of Stanton Lake—just outside the park—and notes from park officials and taxidermists of the region, who have supplemented my meager field experience by knowledge gained during years of residence in the park. Reports from Messrs. Vernon Bailey and Arthur H. Howell, from St. Mary Lake, and from Blackfoot to Belton in 1895, and from Mr. Bailey, from Belton to Kintla Lake, and from Lake McDonald in April, 1918, have been

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examined in the files of the Bureau of Biological Survey, and lists of birds observed during short visits to the park have been kindly turned over to me by Mr. Harold C. Bryant, of California, and Mr. Edward R. Warren, of Colorado. To these gentlemen, as to Mr. E. S. Bryant, taxidermist, of Columbia Falls; Mr. Walter Scott Gibb, assistant chief ranger of the park; Mr. William C. Gird, park guide; Mr. Harry P. Stanford, taxidermist, of Kalispell; and Mr. Donald H. Stevenson, formerly a park guide, I would extend my sincere thanks for much valuable information. Records of a hundred and eighty-seven species have been obtained altogether, but many more doubtless remain to be discovered by future workers in the park. The illustrations are from photographs by Messrs. Vernon Bailey, A. C. Bent, E. J. Cameron, J. E. Haynes, H. W. Nash, H. & E. Pittman, Robert B. Rockwell, J. Rowley, Hon. George Shiras, 3d, and Mr. E. R. Warren; and drawings by Maj. Allan Brooks and by Messrs. Louis Agassiz Fuertes, Bruce Horsfall, John L. Ridgway, Robert Ridgway, and Ernest Thompson Seton; and in the main have appeared previously in the publications of the Bureau of Biological Survey, U. S. Department of Agriculture, and the National Association of Audubon Societies; in Bird-Lore; and the Handbook of Birds of the Western States, published by the Houghton Mifflin Company.

The classification and nomenclature used in the report are those of the 1910 Check List of the American Ornithologists' Union, the Sixteenth Supplement, and the proposed changes in The Auk, up to April, 1918.

II. WHERE THE SUMMER BIRDS MAY BE FOUND.

The park with its heavy forest cover and its snow banks and glaciers would seem an unlikely place for birds to spend the summer, as few species care for either deep forests or snow-clad mountains; but while general conditions limit the abundance of birds found within the boundaries of the park, certain local conditions increase their numbers, so that by knowing where to look one may find a richly varied bird population. While birds breed within fairly definite boundaries governed by temperature during the breeding season, many of them wander widely afterwards, and in the late summer may be encountered almost anywhere in the park.

BIRDS OF THE LOWER LEVELS.

Around the warm outer margins of the park—in the Lake McDonald and the North Fork of the Flathead regions on the west, and the St. Mary, Sherburne Lake, and Belly River regions on the east—islands and tongues of Transition Zone prairie together with swampy meadows, sloughs, and large lakes affording more or less

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marshy cover introduce an element that brings in a variety of birds, however rare or meager in numbers, birds that outside the park breed on the adjoining plains among the lakes and ranches.

Notable among these, including some for which there are no definite breeding records, are the western grebe, Holbœll grebe, eared grebe, merganser, red-breasted merganser, hooded merganser, mallard, gadwall, green-winged teal, ring-necked duck, buffle-head, ruddy duck, bittern, great blue heron,[1] sora rail, coot, upland plover, killdeer, sharp-tailed grouse, mourning dove, turkey vulture, marsh hawk, Swainson hawk, ferruginous rough-leg, prairie falcon, short-eared owl, Acadian owl, Batchelder downy woodpecker, red-headed woodpecker, nighthawk, magpie, crow, raven, cowbird, thick-billed redwing, western meadowlark, Brewer blackbird, western vesper sparrow, western Savannah sparrow, song sparrow, black-headed grosbeak, lazuli bunting, cedar waxwing, yellow warbler, western yellow-throat, redstart, catbird, western house wren, Rocky Mountain nuthatch, long-tailed chickadee, and willow thrush; while on remote wooded lakes, especially on the west side of the park, the shy solitary loon is sometimes found.

While by no means all of these birds will be seen by the hurried tourist, as some of the hotels and chalets are too high for them, and the generally frequented trails follow through the deep forest or over the rocky passes, it is interesting to know of the presence of these lowlanders, and the fact that the birds of the park range from such familiar friends as the catbird, kingbird, and red-headed woodpecker of the low country in Transition Zone to the unfamiliar ptarmigan, leucosticte, and pipit of the Arctic-Alpine slopes above timberline affords an interesting and striking illustration of the vertical variation of the park fauna.

BIRDS OF THE MIDDLE REGIONS.

The characteristic birds of the warm low Transition Zone levels of the park, which are associated with the silver leaf, service berry, wild rose, Douglas spruce, and yellow pine, drop out in the middle or Canadian Zone regions of the park, leaving only the species which thrive in both the lower and middle regions or are characteristic of the colder, higher regions of the Canadian, where they are associated with willows and alders, shrubby birch, smooth Menziesia, honeysuckle and blueberry bushes, lodgepole pines, and the firs and spruces of pure Canadian Zone.

The centers of bird life here are the lakes and streams with their bordering willow and alder thickets, together with the burned-over brushy slopes. Flying over the rivers and lakes, fish hawks and swal-

[1] In former years, sandhill crane.

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lows—either the tree, the cliff, the bank, or the northern violet-green—may occasionally be seen. Even on the most frequented lakes numerous broods of golden-eye ducks may be found, and on the less frequented lakes the rare harlequin may sometimes be seen although it prefers rapid rivers and streams to the quieter waters. On lakes where safe secluded nesting sites are to be had the Canada goose may perhaps be discovered. Along the lake shores the spotted sandpiper, Grinnell water-thrush, and now and then the kingfisher and water ouzel may be noted, although both kingfisher and ouzel are more generally seen along rivers and streams, the ouzel especially near waterfalls or cascades.

On the brushy slopes above the lakes where the forest cover has been replaced by chaparral, among other birds may be found slate-colored fox sparrows, white-crowned and chipping sparrows, juncos, Swainson vireos, Audubon and Macgillivray warblers, and some of the smaller flycatchers, such as the western and Traill.

In the open a variety of hawks—the sparrow hawk, sharp-shinned, Cooper, and goshawk—may be noted, and now and then among the cliffs and canyons a golden eagle may be descried. On rare occasions a western nighthawk, a swift—the black, Vaux or possibly the white-throated—or a hummingbird—generally the rufous but possibly the calliope, black-chinned or broad-tailed—may be caught sight of in passing.

Inside the forest three species of grouse—the Richardson, Franklin, and ruffed—may be flushed, while the close investigator or the camper may be fortunate enough to discover some of the resident owls, including the MacFarlane screech owl, the western and dusky horned owls, the rare hawk owl, and the Rocky Mountain pygmy. A number of woodpeckers are also to be closely watched for, among them the Rocky Mountain hairy, Arctic three-toed, Alaska three-toed, red-naped sapsucker, Williamson sapsucker, northern pileated, and the red-shafted flicker. Among other birds that may be seen are the black-headed jay, western evening grosbeak, Montana junco, western tanager, western winter wren, Rocky Mountain creeper, red-breasted nuthatch, mountain chickadee, chestnut-backed chickadee, western golden-crowned kinglet, Townsend solitaire, olive-backed thrush, Audubon hermit thrush, northern varied thrush, and mountain bluebird.

BIRDS OF THE HIGHER REGIONS.

In the narrow timberline or Hudsonian Zone where the white-barked pine is the dominant tree, there are relatively few characteristic birds. Among them are the Rocky Mountain jay, Clark crow, Rocky Mountain pine grosbeak, Cassin purple finch, crossbill, pine

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siskin, and Bohemian waxwing; while above timberline the number of characteristic summer birds is reduced to three—the white-tailed ptarmigan, gray-crowned leucosticte, and pipit.

III. PERMANENT RESIDENTS AND TRANSIENT VISITANTS.

While most of the birds found in the park in summer are merely summer visitants, coming north in the spring to nest and returning south in the fall to winter, there are some permanent residents, such as the grouse, some of the hawks, owls, and woodpeckers, together with the jays, water ouzels, nuthatches, and chickadees, which presumably never leave the park. Similarly, the birds found in the park in winter may be either permanent residents or winter visitants from farther north, such as the snowy owl, great gray owl, redpoll, snowflake, Lapland longspur, Bohemian waxwing, and northern shrike, which come south during the fall or winter and return north on the approach of spring. In still another category come the spring and fall visitants, which merely pass through the park on their northward and southward migrations, as some of the ducks, snow geese, swans, phalaropes, snipe, and doubtless many of the smaller birds, overlooked or unrecognized by casual observers.

IV. KEY TO THE COMMONER SUMMER BIRDS.

[♂ *male;* ♀ *female.*]

WATER BIRDS.

SIZE OF A GOOSE.

I. Body gray, head and neck black, with white throat patch
Canada Goose, p. 106.
I′. Body black and white, neck streaked with white—*Loon*, p. 113.

SIZE OF A DUCK.

Head partly or wholly green.

I. Head wholly dark green.
2. Bill narrow, underparts wholly white or pale salmon
Merganser, ♂, p. 115.
2′. Bill wide, underparts brown and white or brown and gray.
3. Bill spoon-shaped, breast white, belly reddish brown
Shoveller, ♂, p. 119.
3′. Bill not spoon-shaped, breast brown, belly gray
Mallard, ♂, p. 117.
I′. Head partly green.
2. Head dark green with white spot at base of bill
Barrow Golden-eye, ♂, p. 122.
2′. Head brown with green stripe on side—*Green-winged Teal*, ♂, p. 118.

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Head reddish, brown, or gray.

I. Head reddish or dark brown.
  2. Head reddish, crested; bill long and narrow____*Merganser*, ♀, p. 115.
  2′. Head dull brown, bill short and wide.
    3. Head puffy, unmarked, collar white
      Barrow Golden-eye, ♀, p. 122.
    3′. Head not puffy, side of head with three white spots
      Western Harlequin Duck, ♀, p. 124.

I′. Head not reddish or dark brown.
  2. Plumage plain gray, or gray, strikingly marked with white and brown.
    3. Plumage plain sooty gray, head black, bill white___*Coot*, p. 132.
    3′. Plumage strikingly marked with white and brown
      Western Harlequin Duck, ♂, p. 124.
  2′. Plumage brown, finely streaked and spotted.
    3. Wing patch mainly light blue or bright green.
      4. Wing patch mainly light blue, bill spoon-shaped, size large_____*Shoveller*, ♀, p. 119.
      4′. Wing patch mainly bright green; bill not spoon-shaped; size small_____*Green-winged Teal*, ♀, p. 118.
    3′. Wing patches brown and white or purple and white.
      4. Wing patches brown and white_____*Gadwall*, p. 118.
      4′. Wing patch purple, inclosed by white bars
        Mallard, ♀, p. 117.

SMALLER THAN A DUCK (7–11 INCHES).

I. Breast white, spotted or banded.
  2. Breast and back spotted, tail habitually tipped
    Spotted Sandpiper, p. 133.
  2′. Breast crossed with two black bands, tail not habitually tipped
    Killdeer, p. 134.
I′. Breast bluish gray, face and front of neck black_____*Sora Rail*, p. 131.

LAND BIRDS.

SIZE OF GROUSE OR LARGER.

I. Spread wings 5½–7½ feet.
  2. Spread wings about 5½ feet; head and underparts white
    Fish Hawk, p. 150.
  2′. Spread wings about 6½–7½ feet; head and body brown
    Golden Eagle, p. 148.
I′. Spread wings much less than 5½ feet.
  2. Largely brown or sooty gray.
    3. Brown, barred; head crested, neck ruffed, tail banded
      Ruffed Grouse, p. 137.
    3′. Sooty gray, mottled; without ruffs or tail bands
      Richardson Grouse, p. 135.
  2′. Largely black and white.
    3. Wings and tail white; timberline slopes
      White-tailed Ptarmigan, p. 139.
    3′. Wings and tail black, marked with white; forests
      Franklin Grouse, p. 136.

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SIZE BETWEEN A ROBIN AND A GROUSE.

Largely blue, brown, sooty, or ash gray.

I. Largely bluish, or reddish brown barred with black.
  2. Upperparts partly or mainly bluish, head crested, bill long.
    3. Wings and tail dull blue, spotted with white; lakes and streams
      Belted Kingfisher, p. 157.
    3′. Wings and tail purplish blue, barred with black; forests
      Black-headed Jay, p. 165.
  2′. Upperparts brown, or blue and brown, head not crested, bill hooked; over open fields ..... *Desert Sparrow Hawk*, p. 149.
I′. Largely brown or gray.
  2. Body brown, rump white, wings and tail red below
    Red-shafted Flicker, p. 161.
  2′. Body gray, forehead white.
    3. Body dark gray, back of neck with dark patch
      Rocky Mountain Jay, p. 166.
    3′. Body ash gray, wings and tail black and white
      Clark Nutcracker, p. 167.

SIZE OF A ROBIN.

I. Underparts bright rusty brown; breast with blackish necklace
  Northern Varied Thrush, p. 197.
I′. Underparts reddish brown; breast without necklace ... *Western Robin*, p. 196.

SIZE SMALLER THAN A ROBIN (ADULT MALES[1]).

Partly yellow, contrasted with slaty, black, or brown.

I. Underparts partly or wholly yellow or greenish yellow.
  2. Underparts yellow and slaty, or yellow, black, and white.
    3. Underparts yellow and slaty, head slaty; bushes
      Macgillivray Warbler, p. 186.
    3′. Underparts white, yellow, and black; throat, crown patch, and rump yellow; trees ..... *Audubon Warbler*, p. 183.
  2′. Underparts plain yellow or greenish yellow.
    3. Underparts yellow, face with black mask; bushes
      Western Yellow-throat, p. 186.
    3′. Underparts yellow, wings and tail black; forests
      Western Evening Grosbeak, p. 171.
I′. Underparts without yellow.
  2. Body black and white, crown with yellow patch; forests
    Alaska Three-toed Woodpecker, p. 158.
  2′. Body brown, streaked; wings and tail with yellow patches; cone-laden tree tops ..... *Pine Siskin*, p. 174.

Partly or mainly brown, gray, or blue.

I. Partly or mainly brown or gray.
  2. Partly or mainly brown.
    3. Mainly brown.
      4. Barred with black.
        5. Tail very short; forests
          Western Winter Wren, p. 191.
        5′. Tail normal; open woods
          Western House Wren, p. 191.

[1] The females of strikingly colored birds are usually duller or without color patches.

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4'. Not barred with black; gorget fire red, orange, and brassy green ——— *Rufous Hummingbird*, p. 163.

3'. Partly brown.

4. Crown conspicuously marked.

5. Crown striped with black and white *White-crowned Sparrow*, p. 177.

5'. Crown reddish brown *Western Chipping Sparrow*, p. 177.

4'. Crown not conspicuously marked.

5. Upperparts brown, indistinctly streaked; outer tail feathers partly white; tail wagged; timber-line slopes ——— *Pipit*, p. 187.

5'. Upperparts plain brown and slaty; rusty on wings and tail; bushes, near water *Slate-colored Fox Sparrow*, p. 178.

2'. Partly or mainly gray.

3. Mainly slate gray or slate gray and white.

4. Mainly slate gray, tail short; streams and waterfalls *Water Ouzel*, p. 188.

4'. Head, neck, and chest slate gray; belly and outer tail feathers white ——— *Montana Junco*, p. 177.

3'. Back gray; cap and throat black; cheeks white.

4. Cap with white line over eye; forests *Mountain Chickadee*, p. 193.

4'. Cap without white line over eye; valley bottoms *Long-tailed Chickadee*, p. 193.

I'. Partly or mainly blue.

2. Upperparts grayish blue, marked with black and white; tail short; forests ——— *Rocky Mountain Nuthatch*, p. 192.

2'. Upperparts light blue or greenish blue, unmarked; tail normal; in the open ——— *Mountain Bluebird*, p. 198.

Partly or wholly green or reddish.

I. Upperparts greenish.

2. Crown red, or black, yellow, and orange.

3. Crown red ——— *Ruby-crowned Kinglet*, p. 194.

3'. Crown black, yellow, and orange *Western Golden-crowned Kinglet*, p. 194.

2'. Crown gray, bordered by white below *Western Warbling Vireo*, p. 183.

I'. Body dull reddish or pinkish.

2. Mandibles crossed; head and back uniform ——— *Crossbill*, p. 173.

2'. Mandibles not crossed; head with squarish crimson patch *Cassin Purple*, p. 172.

Order PYGOPODES: Diving Birds.

Family COLYMBIDÆ: Grebes.

WESTERN GREBE: *Æchmophorus occidentalis*.—The snowy-throated western grebe or swan grebe, the largest and most distinguished of all the family, should be watched for carefully in the park, as there are several records of its occurrence. One taken on the

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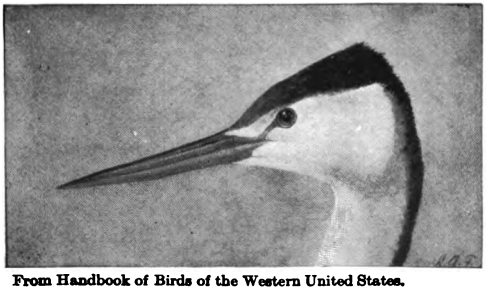
North Fork of the Flathead is to be seen at Lewis's Hotel, and Mr. F. F. Liebig, of Kalispell, has one that came from Lake McDonald before the park was established. It has been seen in similar country close to the park, and one of its floating nests has been found by Mr. Donald H. Stevenson inside the park.

When the grebes nest, as they usually do, in colonies in the tules, after the nesting season they assemble in large companies about good feeding grounds, where they disport themselves with so much vivacity and originality that they supply ready entertainment for many a summer day. Their presence may be recognized by their loud, distinctive *ka-ree'*, *ka-ree'*, and its variations which carry far over the water. Or, they may be picked out from a flock of quiet phlegmatic ducks lying on the water by their quick motions, slender necks, and rapid disappearances and reappearances; for like all grebes they are rapid, expert divers. They also have the grebe habit of lying on one side, showing the silvery and all too famous grebe breast. Across the width of a lake, mirror-like flashes from the breast should be watched for, as also short white lines on the surface of the water, for the long swan-like necks seen at a distance suggest short, white sticks vanishing and reappearing so rapidly that it is difficult to keep track of them. But if you would see these charming birds at their best, get near enough to watch their dextrous work and their delightful individual play.



From Handbook of Birds of the Western United States.

FIG. 19.—Western grebe.

HOLBŒLL GREBE: *Colymbus holbœlli*.—While we saw the Holbœll only on the lower Waterton Lake in Alberta during the summer, it has been found by Mr. Bryant on Lake McDonald, and on April 22, 1918, two were seen by Mr. Bailey, "one at the upper end of the lake in quiet water and one out in the middle of the lake where big waves were rolling higher than its head;" so another rare possibility is open to observers on that lake rich in opportunities.

Next to the western grebe in size and striking appearance the Holbœll has a rather heavy red neck and a white throat patch that give it a certain stolidity of appearance when compared with the swan grebe; but while it may lack vivacity and grace, like all the grebes it is a master of its trade and a study of an old mother diving for water weeds for her young, and leading them along safe and pleasant shores will afford many enjoyable hours.

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HORNED GREBE: *Colymbus auritus.*—On a pond above the Swiftcurrent Lakes, only a short distance from Many Glaciers, Mr. Stevenson was fortunate enough to discover the floating nest and eggs of the sprightly little horned grebe, whose reddish neck, puffy side crests, and bright red eyes, almost "perched on its bill," as he says, make it a striking, cocky figure. Sometimes when diving it gets so wet that all its distinctive plumes are lost sight of and only the red neck is left to tell the tale. Careful watch should be kept of the marshy meadows of this fruitful Swiftcurrent section and similar places in the park that other nests may be discovered.

From Handbook of Western Birds. L. A. Fuertes.

FIG. 20.—Horned grebe.

In October, 1887, Dr. George Bird Grinnell found the birds "quite abundant" on the St. Mary Lakes and the prairie lakes about the head of Milk River.[1] A pair were also reported in June, 1895, by Messrs. Vernon Bailey and Arthur H. Howell, from a pond on the prairie near Blackfeet Agency, now Browning.

On April 21, 1918, Mr. Bailey saw dozens of the puffy headed horned grebes, in full breeding plumage, on Lake McDonald, but the next day, when the wind had come up and the waves were rolling, only a few were seen.

EARED GREBE: *Colymbus nigricollis californicus.*—As this is the grebe most likely to be seen in the park, it is important to know its distinctive characters. Only about half the size of the white-throated western grebe and the red-throated Holboell—or about a foot long—its median, pointed crest, light ear tufts, and dusky neck distinguish it from the puffy-headed, rufous-necked little horned grebe. In manner, also, it is quite different from the cocky little horned grebe, which comes up from below with a shake of its feathers, points its bill down, and is gone; for it will sit quietly on the water looking at you with gentle interest for a long time. It has been reported by Mr. W. S. Gibb as breeding on various park lakes, notable among them Lake McDonald, and it has been found by Mr. W. C. Gird, in July and August, on the middle lake of the Swiftcurrent chain not far from the place where Mr. Stevenson found the nest of the horned grebe and where it was evidently taking advantage of the superior feeding ground offered by the unusually muddy lake bottom. Mr. Gird has also seen it on Glenn and Elizabeth Lakes, in the Belly River country, and on Waterton Lake, at the Canadian boundary. It is interesting to know that in October, 1887, Dr. Grinnell also found it abundant on the St. Mary Lakes. Wherever it is found, close at

[1] Some Autumn Birds of the St. Mary Lakes Region, Forest and Stream, Vol. XXX, p. 368, May 31, 1888.

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From Handbook of Birds of the Western United States.

EARED GREBE.

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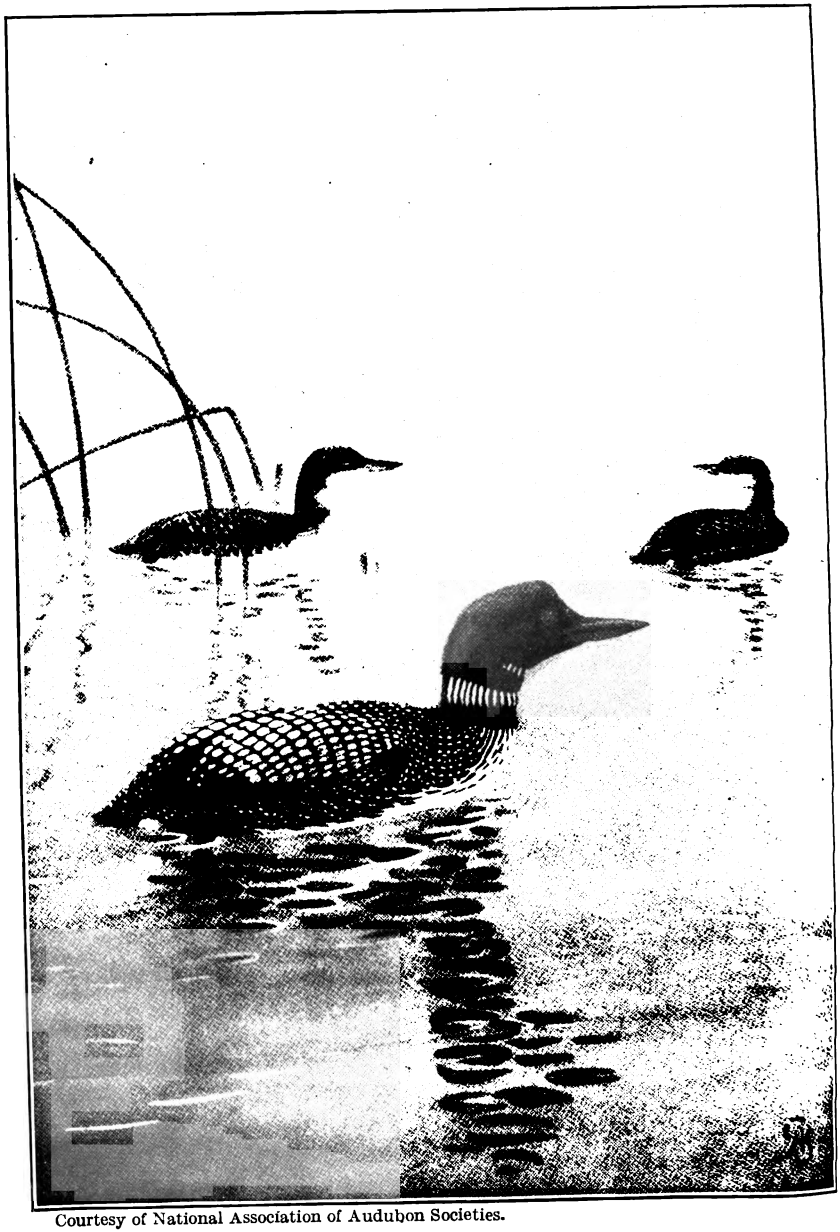

Courtesy of National Association of Audubon Societies.

LOONS.

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hand it is a quiet companion of the solitudes, while at a distance its mellow *hoy-ee-up* comes to be pleasantly associated with the beautiful lakes where it makes its home.

Family GAVIIDÆ: Loons.

Loon: *Gavia immer.*—Few of the large conspicuous birds which once dignified our frontier are left to delight the eye of the nature lover. Trumpeter swan, sandhill and whooping cranes, Hudsonian curlew, and godwit alike have fallen prey to the thoughtless marksman, and even the great blue heron is now rarely to be seen. But the loon, though driven by the advance of the gunning tourist and the motor boat to seek deeper and more remote solitudes, is still to be found on the forest-encircled lakes of Glacier Park, which afford him ideal refuges.

While the name Loon Lake has been given locally to Rogers Lake on Camas Creek, Mr. Gibb says he has seen dozens of young loons in other parts of the park, and they apparently breed on the lakes of both eastern and western boundaries, and from Sherburne Lake below Many Glaciers to the Waterton Lakes on the Canadian line. On the small lakes along the North Fork of the Flathead—Bowman, Quartz, and Logging—Mr. Gird says they have to leave in October, as the water is generally frozen over by November; but at the upper end of Kintla Lake Mr. Bailey saw a returned migrant on April 16, 1918. They can stay all winter on Lake McDonald, as both the inlet and outlet remain open. On the Lower St. Mary, just outside the park, during October and the first half of November, 1887, Dr. Grinnell saw several of the loons, and reported hearing them frequently.

In the nesting season one pair of the great, handsomely marked black and white birds seems to populate a mountain lake, their loud weird cry adding a rich flavor of wild life to its forested shores. On two of the most secluded lakes that we visited, fleeting glimpses were had of the noble birds. Glenn Lake, whose four miles of narrow timbered length lead up a glacial amphitheater, offers peculiarly safe harbor for the hunted creatures of forest and lake. Here, on leaving the trail to get sight of the lake, after forcing a passage through the dense undergrowth and the down timber, at the edge of the water a resting loon was almost stepped on, and up at the head of the lake under the glacier a group of Canada geese was discovered. Another lookout across the lake revealed a dark reddish brown form standing on a short strip of beach on the opposite shore, and the glass excitedly raised showed the long stiltlike legs and dark color of a young moose. A congenial home, indeed, for the solitude-loving

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loons! Crossley Lake, separated from Glenn Lake by a terminal moraine, may afford additional feeding grounds for the Glenn Lake loons, or shelter a pair of its own. In any case, on another day when looking out over its broad surface toward the great glacial amphitheater above, I saw two of the loons sitting unafraid out on the middle of the lake. As I watched they rose and flapped their black wings, dived, and came up, lying with super-duck length on the water and flashing their white underparts. Then, perhaps becoming conscious of observation, they made their way over the beautiful green and purple deeps of the lake toward the sheer wall of Gable Mountain, all too soon disappearing from view.

Order LONGIPENNES: Long-winged Swimmers.

Family LARIDÆ: Gulls and Terns.

California Gull: *Larus californicus.*—Mr. F. F. Liebig of Kalispell has a mounted specimen of one of these large gulls in the mottled immature plumage which was taken at Lake McDonald, and he has seen two others on the lake.

Ring-billed Gull: *Larus delawarensis.*—The ring-billed gull, with white head and underparts, and yellowish bill with a black band near the tip, has been identified just outside the park by Dr. Grinnell, who saw it several times on the Lower St. Mary Lake in September and October, 1887, resting on sand bars in company with terns; and Mr. Stevenson writes me that "at least one variety of gull is a summer visitor of the park, while they are common on the plains east of the park, noticeably at Duck Lake and the slaughter-house located on a pond at Browning." He says that he has also noted them on Sherburne Lake in midsummer. Mr. Gibb states that gulls nest at St. Mary Lake and Lake McDonald, along the North Fork of the Flathead, and on the Belly River, and adds that he has seen them in summer on Lake McDermott. On April 21 and 22, 1918, Mr. Bailey saw a few gulls, apparently of this species, on Lake McDonald.

Bonaparte Gull: *Larus philadelphia.*—The smaller Bonaparte gull, the summer adults of which have both bill and head black, and the winter adults and young of which have a conspicuous dusky spot on the ear coverts, is reported from the park by the two taxidermists, Mr. Bryant and Mr. Stanford, and Mr. Bryant thinks he has seen it on Lake McDonald. Mr. F. F. Liebig has a mounted specimen taken on St. Mary Lake when the park was a National Forest.

Forster Tern: *Sterna forsteri* (?).—Black-crowned and forked tailed terns presumably of this species were seen flying over the northern Waterton Lake in August, and they probably cross the

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park on their migrations. In September and October, 1887, D Grinnell found small terns abundant on the Lower St. Mary Lak They were apparently feeding on small fish and were busy over tl shallows near the inlet, where they were wind-bound for several day

Order STEGANOPODES: Totipalmate Swimmers.

Family PHALACROCORACIDÆ: Cormorants.

DOUBLE-CRESTED CORMORANT: *Phalacrocorax auritus auritus.*—Or of these singular black birds with long snaky neck and plumelik crests over the eyes was added to the park list by Dr. Grinnel October 15, 1887, when he found it on the Upper St. Mary Lal below the narrows.

Family PELECANIDÆ: Pelicans.

WHITE PELICAN: *Pelecanus erythrorhynchos.*—The great, specta ular white pelicans, with their long bills and large orange fis pouches, have been seen by Mr. Gibb at Lakes McDonald and She burne in July and August, usually in twos, evidently wandering aft the breeding season. Dr. Grinnell, in October, 1887, saw a solitar wanderer at Pike Lake near the foot of Chief Mountain. It ap peared from the north just before sunset and spent the night on tl lake.

These records, together with those of other rare birds, while inte esting in themselves are peculiarly so to the observer who by car ful watching may make equally notable discoveries.

Order ANSERES: Lamellirostral Swimmers.

Family ANATIDÆ: Ducks, Geese, and Swans.

MERGANSER: *Mergus americanus.*—Mr. Stevenson informs me th the merganser breeds throughout the park. One of the females wit light reddish brown head and horizontal crest was seen August by Mr. Bailey on Swiftcurrent Creek, below the falls; and tw others with one of the green-headed, light-breasted males were see on August 27 on Lake McDonald. On April 11, when Mr. Baile visited the lake, mergansers were common there, and were said to hav been there all winter; during the weeks when the lake was froze over, gathering in considerable numbers in the rapids of McDonal Creek. On April 21 and 22 they were on the lake in moderate nun bers. Many were also seen along the North Fork of the Flathea between April 11 and 21.

Mr. Higginson, when collecting just outside the park, wrote: "Si birds—two males and four females (or young)—stayed aroun

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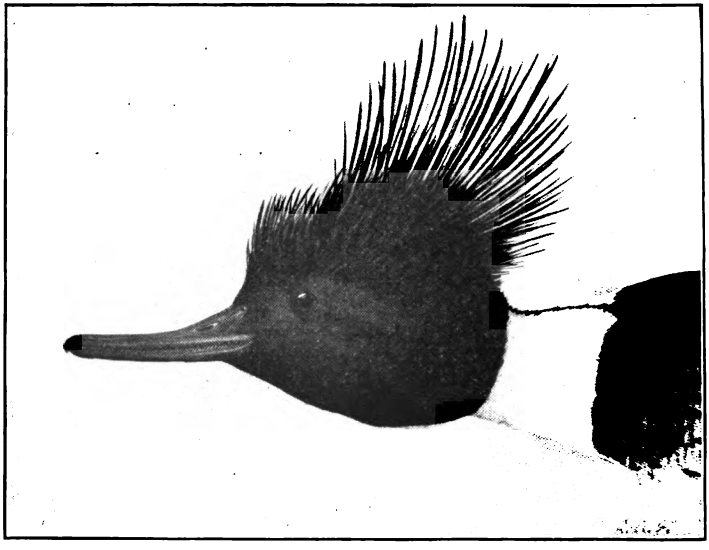
Stanton Lake all winter long. When the lake froze up they went up the creek, swimming about in the big pools. No wild fowl of any other kind came into the lake from November 15 to February 22." Mr. Bryant has taken merganser eggs on Stanton Lake, so the birds are doubtless resident.

The mergansers have the interesting habit of fishing in small bands, and their maneuvers will repay close observation.

RED-BREASTED MERGANSER: *Mergus serrator.*—Late in October, 1887, Dr. Grinnell found red-breasted mergansers, with the long, hairlike crests, in company with a large variety of waterfowl, abundant on the Lower St. Mary Lake, and Mr. Gird reports them as found in spring, summer, and fall between Waterton Creek and the



From Handbook of Birds of the Western United States.

FIG. 21.—Red-breasted merganser.

North Fork of the Flathead on the west and Belly River on the east side of the park. Mr. F. F. Liebig has a specimen taken on Lake McDonald some years ago.

These mergansers also hunt in companies, as Mr. E. H. Eaton describes it, "sometimes advancing with wide, extended front, driving the fish before them and diving simultaneously so that, whichever way their prey may dart, there is a serrated beak and capacious gullet ready to receive them."

HOODED MERGANSER: *Lophodytes cucullatus.*—Mr. Stevenson reports seeing the hooded merganser, with the white-centered, wheel-shaped crest, mostly in spring and fall, in ones or twos on small ponds, but Mr. Bryant says that it breeds on the Middle Fork of the

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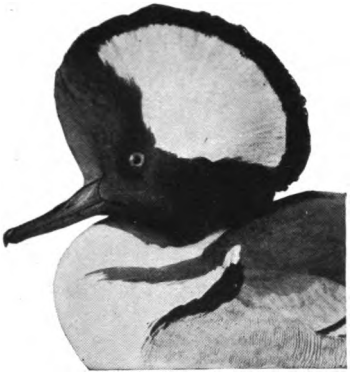
Flathead and 'is great for laying eggs in the nests with golden-eyes and buffle-heads and then scrapping over the nest." Apparently it is commonly called wood duck.

MALLARD: *Anas platyrhyncha.*—The green-headed drake mallard, which is familiar to all from his resemblance to the domestic stock derived from the wild, and the brown-mottled female, which may be recognized by her large size, white-bordered purple wing patches, her white outer tail feathers, and her loud barnyard quack, should be looked for in the lower levels of the park. In the willowy borders of Sherburne Lake, on August 5, we heard the quacking of mallards, and at the oil wells down the lake were shown two nearly grown young that the Stevensons had raised from eggs under a hen. They had become so thoroughly domesticated that they allowed the children to carry them around, and, although they went down to the lake with the wild mallards in the daytime, returned to the house at night. An adult and one nearly grown young were seen, August 9, by Mr. Bailey in a marsh just above Lake Elizabeth, and on August 20 across the Alberta line three were flushed from one of the small sloughs. On August 21, we saw eleven mallards on Reynolds Lake a few miles south of the boundary.



From Handbook of Western Birds. L. A. Fuertes.

FIG. 22.—Hooded merganser.

Mr. Stevenson says that they breed in lakes and ponds at the lower elevations of the park and in 1914 were quite plentiful on the inlets of both the upper and lower Sherburne Lakes. A mounted mallard seen at Lewis's came from the North Fork of the Flathead, and Mr. Gird says they are common there as well as about old beaver ponds on the Belly River. In the fall of 1887 Dr. Grinnell found them "extremely abundant throughout the St. Mary Lakes region." They were also found feeding in open water late in November, and he said that undoubtedly "a few remain all winter on mountain streams."

A few mallards were seen by Mr. Bailey, April 10 and 11, 1918, along the Middle Fork of the Flathead and at Lake McDonald; and more, mostly in pairs, April 12–19, along the North Fork, from the mouth of Camas Creek to Kintla Creek, and in many of the small lakes and ponds; also on April 21, many pairs and flocks on Lake McDonald. They were evidently both breeding and migrating. Mr. E. H. Myrick, the forest ranger at Belton, saw a family with five

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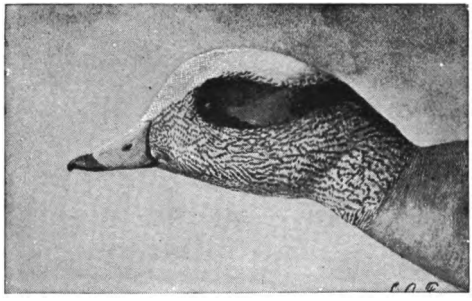
downy young in a pond on the river flats near Nyack, April 5; and as the forest cruiser, H. R. Flint, saw mallards in the river near there in December, they evidently wintered there and bred early.

GADWALL: *Chaulelasmus streperus.*—As their Latin name indicates, the gadwalls are noisy ducks. The drake may be recognized by his brown and white wing patches, and the duck by her white patches and pure white wing linings.

A brood of about a dozen dark, yellow-spotted, downy young were found, July 19, by Mr. Bailey, swimming around under the willows on a beaver pond between Many Glaciers and Sherburne Lake. One adult was also seen, August 9, on Lake Elizabeth, in the Belly River region. In the fall of 1887 Dr. Grinnell found gadwalls "abundant on shallow prairie lakes on Milk River Ridge and northward."

BALDPATE: *Mareca americana.*—Mr. Stevenson questions whether the baldpates breed at all in the park, and Mr. Gibb reports them only as spring and fall migrants. In 1887 Dr. Grinnell found them in the St. Mary Lakes region, abundant through September and October but leaving before the 1st of November. On April 21, 1918, Mr. Bailey found baldpates the most numerous ducks on Lake McDonald, in large and small flocks, out in the middle of the lake and along shore. Sometimes a hundred or more would be seen sitting in long rows on a beach in the sun. The next day the lake was rough and few were seen, so it is evident that the migrating hordes had merely stopped to rest.



From Handbook of Birds of the Western United States.

FIG. 23.—Baldpate.

GREEN-WINGED TEAL: *Nettion carolinense.*—A mounted specimen of the pretty little green-winged teal with brown head, green cheek stripe and wing patch may be seen at Lewis's, and Mr. Gibb says that it nests in the park, particularly on the west side of the mountains. Mr. Stevenson says that it is seen in great flocks spring and fall, being the commonest teal of the park. In 1887 Dr. Grinnell found it abundant in the St. Mary Lakes region in open water up to November.

On April 21 and 22, 1918, Mr. Bailey found green-winged teal among the most abundant ducks on Lake McDonald. Hundreds were seen scattered over the lake in small mixed flocks of other species.

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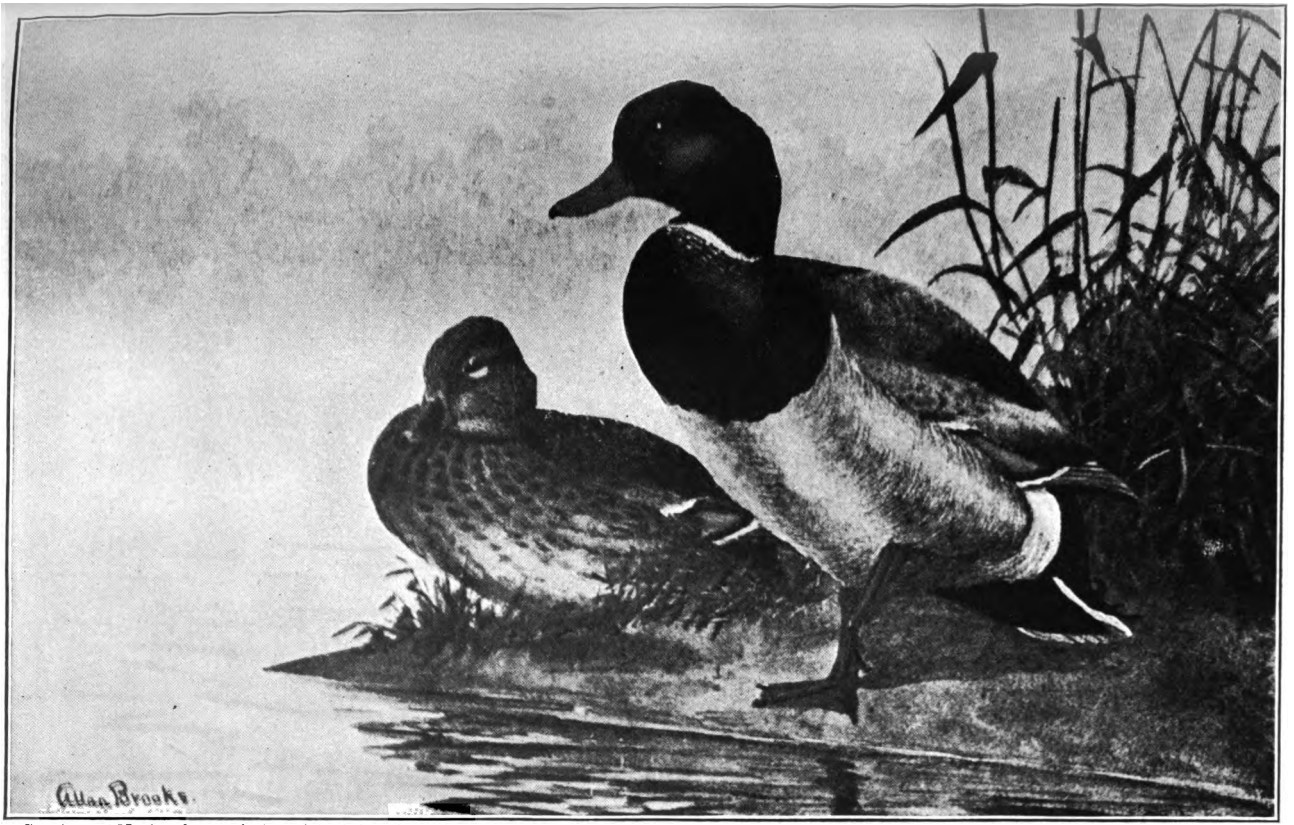

Courtesy of National Association of Audubon Societies.

MALLARDS.

Left figure, female; right figure, male.

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Courtesy of National Association of Audubon Societies.

SHOVELLERS.

Left figure, female; right figure, male.

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BLUE-WINGED TEAL: *Querquedula discors.*—The blue-winged teal with his white eye crescent, large blue wing patch, and brown body is one of the easily recognized ducks and may be looked for as a spring and fall migrant. In 1887 Dr. Grinnell found the blue-wing abundant on the Lower St. Mary Lake in September, but he says it was one of the earliest ducks to leave for the south.

CINNAMON TEAL: *Querquedula cyanoptera.*—Mr. Stevenson has noted the cinnamon-colored teal in the spring migration, and Mr. Bryant says that it used to breed at Flathead Lake.

Photograph by Robert B. Rockwell.

FIG. 24.—Green-winged teal.

SHOVELLER: *Spatula clypeata.*—A female shoveller with its spoon-shaped bill was seen, August 29, and a male and female on August 30 on Lake McDonald. Mr. Stevenson and Mr. Gibb report them as spring and fall migrants, but not common. In the fall of 1887 Dr. Grinnell found them very abundant on the prairie lakes and the Lower St. Mary Lake associated with teal, widgeon, gadwall, and mallard. He said they left late in October. In June, 1895, Messrs. Bailey and Howell reported shovellers seen in nearly all the ponds on the prairie near Blackfeet Agency, now Browning. Six or eight pairs were seen and a few single males. On April 21, 1918, Mr. Bailey saw hundreds of shovellers on Lake McDonald, some in pairs but more in large flocks, and all the males in handsome spring dress, with black head, white chest, and chestnut belly.

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PINTAIL: *Dafila acuta tzitzihoa.*—Mr. Stevenson and Mr. Gibb speak of seeing the brown-headed pintail in spring and fall; and Mr. Gird, who has noted them in the Belly River region and the northern part of the park, says they come into the mountain lakes from the prairie about September. In the fall of 1887, Dr. Grinnell found them in small numbers on Milk River Ridge and the prairie lakes of the St. Mary Lakes region, though they were not nearly so abundant as other fresh-water ducks. On April 21, 1918, Mr. Bailey found them fairly common on Lake McDonald in small flocks. While mixed with other species on the water, they kept together when they flew.

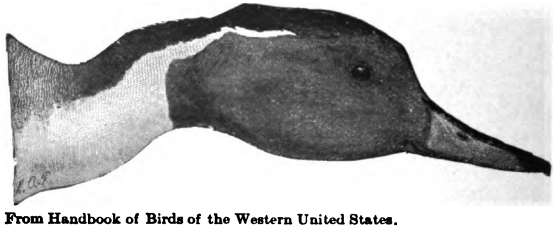
From Handbook of Western Birds. L. A. Fuertes.

FIG. 25.—Blue-winged teal.

From Handbook of Western Birds.

FIG. 26.—Cinnamon teal.

WOOD DUCK: *Aix sponsa.*—Great confusion has arisen from the local application of the name wood duck to the Barrow golden-eye and the merganser, but Mr. H. P. Stanford has a mounted wood duck that he took at Flathead Lake, and says he has seen the ducks on the ponds at the upper end of Lake McDonald.



From Handbook of Birds of the Western United States.

FIG. 27.—Pintail.

All the ducks of the region which may be called wood ducks because they nest in hollow trees should be carefully distinguished. In the golden-eyes the drake has a green head with a white spot at the base of the bill, while the duck has a puffy, dark-brown head. In the sheldrake, the scarcely crested head of the drake is dark *green*, while the long-crested head of the duck is *reddish-brown*. In the hooded merganser the drake has a black *wheel-*

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shaped crest with a large white *fan-shaped patch*, while the duck has an *unmarked*, grayish brown head. But in the wood ducks the drake has red eyes, a purplish-chestnut breast spotted with white, a heavy green and purple drooping crest and the *sides of the head streaked with white;* while the gray-headed female has a *white eye patch streaking backward.* The white lines on the head are enough to distinguish both sexes of wood duck from both mergansers and goldeneyes.

From Handbook of Birds of the Western United States.

FIG. 28.—Canvas-back.

REDHEAD: *Marila americana.*—Though not a common migrant in the park, the redhead has been noted by Mr. Stevenson, Mr. Gibb, and Mr. Gird. In October, 1887, Dr. Grinnell found it abundant on the St. Mary Lakes. On April 21, 1918, Mr. Bailey saw a pair out in the middle of Lake McDonald.

CANVAS-BACK: *Marila valisineria.*—Mr. Gibb reports seeing the canvas-back during migration, and Mr. Stevenson reports it from Duck Lake east of the park in fall. In October, 1887, Dr. Grinnell found it on the Lower St. Mary during bitter cold weather in considerable numbers. On April 21, 1918, Mr. Bailey saw a few small flocks on Lake McDonald, readily distinguished from the surrounding flocks of smaller ducks.

From Handbook of Western Birds.

FIG. 29.—Scaup duck.

SCAUP DUCK: *Marila marila.*—On April 21, 1918, Mr. Bailey found these large scaups with light-gray backs and bright blue bills scattered over Lake McDonald from one end to the other in both large and small flocks, aggregating at least hundreds. In the fall of 1887 Dr. Grinnell found them abundant on the Lower St. Mary just outside the park.

LESSER SCAUP DUCK: *Marila affinis.*—Mr. Bryant told us that the lesser scaup, whose head is glossed with purple instead of green, passes over Lake McDonald, and Mr. Stevenson writes that a duck which he takes for it occurs in the park during the fall months in large flocks. Dr. Grinnell in 1887 found it abundant on the prairie lakes adjoining the St. Mary Lakes region, and when these froze up on the Lower St. Mary Lake.

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RING-NECKED DUCK: *Marila collaris*.—Mr. Bryant says that the ringneck is found in swampy ground in the park in summer, so that it is well to add it to the list of those to be carefully looked for. The drake, while having the black head and breast of the scaups, may be distinguished by the light ring on its bill, the brown collar and black back, the duck by the gray wing patch.

BARROW GOLDEN-EYE: *Clangula islandica*.—The handsome green-headed Barrow drake has what has been described as a "spread-wing shaped white patch" at the base of the bill which distinguishes the Barrow golden-eye of the mountains from the American golden-eye, whose drake has only a round white spot at the base of his

Photograph by George Shiras, 3d. Courtesy of Bird-Lore.

FIG. 30.—Golden-eyes on Yellowstone Lake.

bill. But like most male ducks, the handsome Barrow is rarely seen in late summer, apparently going off to some secluded place to molt, leaving his mate to rear the young. An old duck, with puffy brown head, golden eye or "brass eye," white underparts and large white wing patch, leading around a brood of downy young, is one of the delightfully familiar sights on the beautiful mountain lakes of Glacier Park. When rowing on Lake McDermott one July evening, along the shore opposite Many Glaciers we came to an old mother with three young. Her white neck line, cutting the brown of her head, showed conspicuously in the dusk, as did the little white cheeks contrasting with the dark crowns of the ducklings. When we rowed near the mother gave a low guttural call, in response to which the

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little fellows instantly swam close to her side. When they all swam on together and we followed, though my quieting talk partly reassured the anxious mother, her distress was so appealing that with a quick turn of the paddle I sent the boat out into the lake—to our mutual relief. Feeling safe at last, the little ones strung out in single file behind their mother, swimming slowly and contentedly along close to shore. As we watched them, they seemed a fitting part of the peaceful sunset picture—the quiet lake over which the cool night air came down from the mountains, the dark-spired shore line from which came the vesper song of the thrush, and the sunset light above, fading out on the snowy slopes of the peaks.

The anxiety of the old duck had doubtless been partly due to tragic experiences, for up the lake two broods were seen, one with 11 and one with 12 young, while one was reported to us from Sun Camp with 14, and the usual clutch ranges from 9 to 12. Four-footed prowlers had perhaps trotted along the lakeshore by moonlight, in their turn having to provide for hungry families waiting in some well-hidden den—for so the world progresses. Broods of various ages as well as numbers were seen in the park, some just hatched, some fairly well grown, while old ducks apparently only leaving their nests for a meal were noticed at various places. One of these solitary ones flew up near the head of Grinnell Lake one day, where it dived deep through the green water. It was aggravating not to be able to follow the ducks as they flew back down the lakes to their nests. What may have been such a return home was happened on a year or so ago by Dr. Grinnell, though he saw it at too great a distance to be sure. He writes, "I saw a golden-eye that had been swinging about over the lake on the middle fork of Swiftcurrent, fly over some dead, burned, pine timber on Wilber Creek and stop before a large pine, where it hovered as a barn swallow does before its nest, and then disappeared."

At Sun Camp, one morning late in July, I was surprised to see a golden-eye fly out over the lake below in large disturbed circles, and, as a motor boat came noisily by, fly high up on the side of the cliff below the chalet, acting strangely as if going to take refuge on the rocky promontory. That same morning Mr. Bailey saw a flock of thirty or forty golden-eyes fly up past the chalet toward the upper end of the lake, already gathered into a fall flock anticipating the southward flight, although Dr. Grinnell found the ducks on the Lower St. Mary among the last to leave.

On April 22, 1918, when at Lake McDonald, among the golden-eyes seen too far out to distinguish the species, Mr. Bailey saw one small flock at the upper end of the lake so close in shore that with the glass he could distinctly see the crescent-shaped spots on the cheeks of the two old males, which were in high breeding plumage.

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BUFFLE-HEAD: *Charitonetta albeola.*—Mr. Bryant once found a nest in a stump on a flat of Dutch Creek, which he identified from the eggs as that of a buffle-head, but the bird was not seen and no nests were found in the marsh bordering the lake. Mr. Stevenson says the buffle-head is common in the park in spring and late fall, but he has never seen either nest or young. His father now suspects that it breeds near Sherburne Lake. The mounted bird to be seen at Lewis's came from the Middle Fork of the Flathead. On the St. Mary Lakes, Dr. Grinnell found it, like the Barrow golden-eye, among the last to leave.

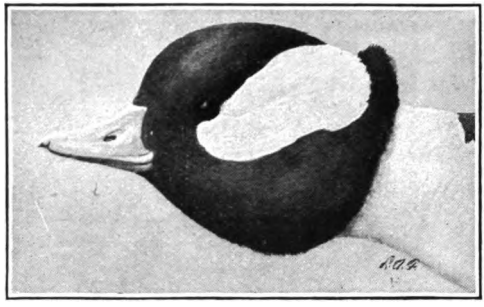

FIG. 31.—Buffle-head.

On April 21, 1918, Mr. Bailey found many flocks of buffle-heads on Lake McDonald, usually with large flocks or in the great assemblies of mixed species of ducks. At a distance, he says, they looked like pure white balls—snowballs—floating on the water.

WESTERN HARLEQUIN DUCK: *Histrionicus histrionicus pacificus.*—The western form of the little harlequin, whose distribution is given as northwestern America and Siberia, and which spends its summers in rapid mountain streams, is one of the most notable birds found in Glacier Park. Everything about it is distinctive. The plumage of the drake is bizarre enough to merit the name harlequin, with its gray and rich brown body colors strikingly slashed with white, and while the duck, according to the accepted custom in ornithological circles, is as dull colored and inconspicuous as her lord is handsome and striking, she still has unusual face marks—two white spots on each side of the head that serve to identify her across a lake.

From Handbook of Western Birds. L. A. Fuertes.

FIG. 32.—Western harlequin duck.

Still more distinctive are the harlequin's habits, for, like the water ouzel, an habitué of foaming mountain streams, it rides their rapids with the abandon of enjoyment. On the rapids connecting the two St. Mary Lakes, in the spring of 1895, Mr. Bailey found eight or ten "diving, bobbing on the rough surface, drifting or darting down over the rapids, and then gathering in a bunch below to fly

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back upstream for another descent." A family of seven was seen near the end of August by members of our party on Mineral Creek, "bobbing over the rapids in single file," and on McDonald Creek a few days later we saw a family of five. Here gently tilted shelves of shale gave an alternation of green shallows and foaming rapids that the ducks could make their way through upstream. As we looked, the close file of five, each with its white head spots and so nearly alike in size that we could only surmise that the leader was the mother, swam rapidly up through the white foam, using wings as well as webbed feet and holding their heads high, as the foam sometimes came up to their bills. Once when a rapid was too high they made a detour up a slanting side chute ending in a ledge over a foot in height. Four of them successfully jumped up the wall, but the fifth made a slip and was caught by the swift current and carried back several feet into the foam. When he came up he made another mistake, stepping on a slippery, sloping rock, and a second time was caught by the water and carried down into the foam. When the whole five had gone up through a long stretch of rapids toward the fall where some old water ouzel's nests were found, they discovered a fisherman casting a line in the bottom of the gorge; so after some hesitation they turned around and giving themselves up to the churning water came bobbing down over the rapids with an air of buoyant ease that made a rarely pretty sight. At the foot of the rapids one of them, perhaps the unskillful one which had had trouble in getting upstream, instead of pointing head forward was turned sideways across the stream. As they swam over to a quiet bay along shore they were greeted by one of the family that had been left behind—if appearances were to be trusted.

A mother and six young were seen at Grinnell Lake about the middle of August by Dr. Grinnell, who sent me an interesting account of their actions. He was standing on the beach when they came in sight, swimming close to the shore. He says: "They did not notice me and went along slowly and passed me within 12 or 15 feet. The little ones were active in diving, as much so as the mother bird, but remained under the water a much shorter time. All were active, vigorous swimmers and divers. I heard no call from the young, but the mother uttered a hoarse croaking quack.

"After they had gone perhaps a hundred yards beyond me, they seemed to have satisfied their appetites, and drew close to shore, disappearing behind a little point. I went around to the little cove where they had gone, and as I appeared they were startled and swam swiftly from the shore out into the lake. As I stood quiet they at once recovered from their alarm, turned about, and swam back toward shore, and then all seven climbed out on a dead tree trunk that had fallen into the lake and stood there side by side, drying

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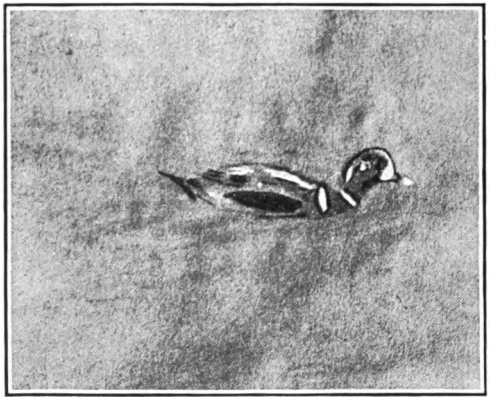
their plumage and seeming to enjoy the sun. They reminded me of a row of wood ducks. When the young had finished dressing their down, they sat down on the stick, some lengthwise and some across the log, the mother, which had been the last to leave the water, being nearest to it."

In the Olsen Valley, August 21, 1917, Mr. Robert S. Yard saw seven harlequins, the young apparently nearly grown. On Gunsight Lake, a month earlier, we saw several harlequins which flew up and down the St. Mary River, near whose rapids they very likely made their homes. On the North Fork of the Flathead they have been seen by Mr. Bryant, and Mr. Stevenson feels sure that they breed along swift mountain streams throughout the park. On August 4 and 5, 1914, Mr. Aretas A. Saunders saw five birds on the Upper Two Medicine Lake. One of the hardy ducks was seen in the winter of 1917 by Mr. Gibb swimming in the swift water above McDermott Falls.



Photograph by E. R. Warren (retouched).

FIG. 33.—Harlequin duck at Iceberg Lake.

On Iceberg Lake, June 27, 1913, Mr. E. R. Warren saw a pair of the ducks and photographed one. "At the time," he says, "the lake was mostly covered with ice and snow, merely a narrow strip of open water 40 or 50 feet wide along the side opposite the glacier, and in this the brightly clad drake and his more quietly dressed mate were swimming back and forth. They were comparatively tame and paid little attention to me as I stood on the shore and watched them, though they kept in motion continually. The only time they took wing was to fly over a narrow bit of ice. Later I saw them get out and walk on the same ice. While I was equipped with a Graflex camera, the day was very dark and cloudy, raining occasionally, and I did not succeed in getting a single good negative. Even the strong reflection from the ice and snow did not help out sufficiently. It was the chance of a lifetime, and I will never cease to regret not having obtained good pictures." Borrowing Mr. Warren's best negative, we had it strengthened and touched up and present it here for its great local interest. Bird photographers visiting the park while the drake is still to be seen in June should watch carefully for opportunities to obtain better results.

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WHITE-WINGED SCOTER: *Oidemia deglandi deglandi.*—One of these large black sea ducks was seen by Mr. Stevenson in the fall of 1906, after a big storm, and in September, 1910, he shot three on a small pond near the east line of the park.

From Handbook of Western Birds. L. A. Fuertes.

FIG. 34.—White-winged scoter.

RUDDY DUCK: *Erismatura jamaicensis.*—The droll little ruddy duck, with his bright blue bill, ruddy body, and spiked tail, has been found by Mr. Bryant in the nesting season on the North Fork of the Flathead, where there are a number of small ponds and sloughs that offer congenial nesting sites; but no actual nests have been located. During the spring migration Mr. Stevenson has found the ruddies rather common on Sherburne Lake, and in October, 1887, Dr. Grinnell found them very abundant on all the lakes of the St. Mary region.

On April 21, 1918, Mr. Bailey found them among the more numerous ducks on Lake McDonald, "often giving a ruddy glow to the great mixed flocks along the shores, on the beaches, or out in the middle of the lake. Many hundreds or a few thousands would give a fair statement of their numbers on the lake."

FIG. 35.—Ruddy duck.

SNOW GOOSE: *Chen hyperborea hyperborea.*—Hordes of white geese are reported by Mr. Stevenson as passing over the park in the migrations, especially in fall; but in 1887, among the thousands of geese seen in October, Dr. Grinnell identified only three as *hyperborea.* They came October 25, and kept mostly by themselves, feeding with the ducks in the shallows where the inlet enters the lake.

ROSS GOOSE: *Chen rossi.*—The first Ross goose reported by Dr. Grinnell in the St. Mary Lakes region was on October 1, 1887. He at first took the flocks for snow geese but one shot by an Indian proved to be the Ross goose, which is smaller than the snow goose and whose bill is without black on the cutting edges. For a month, he says, migrating flocks of from twenty to a hundred were constantly passing over the lakes and crossing the mountains on their way south.

CANADA GOOSE: *Branta canadensis canadensis.*—Several pairs of the great gray Canada geese, with the black head and white throat

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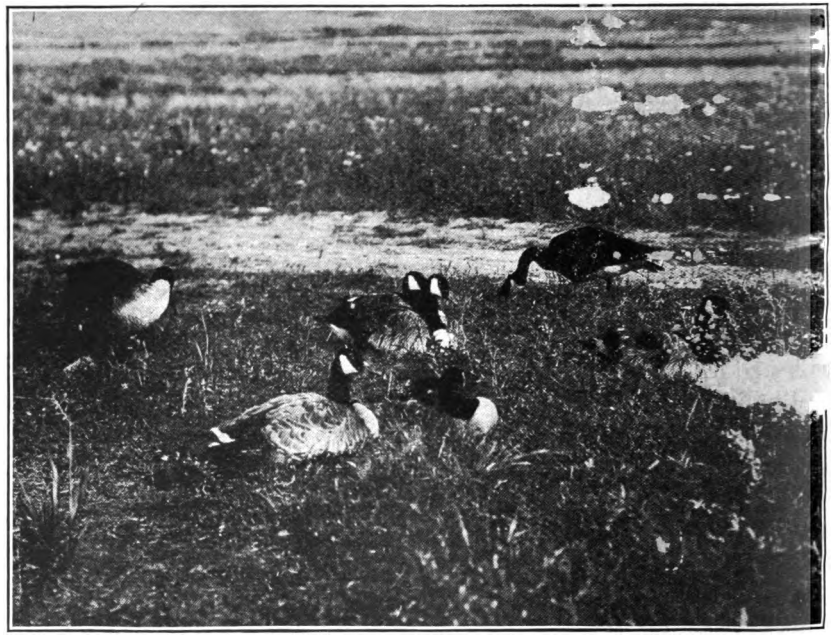
patch, nest in the vicinity of Many Glaciers, especially about the head of Sherburne Lake. One pair with very young goslings has been noted on Lake McDermott. A pair had nested on Lake Josephine for six years, Mr. Gibb told us, but had apparently been driven off by the season's logging. Perhaps they had gone up to Grinnell Lake, he suggested. Anxious to find the great birds at home on their northern breeding grounds, when we rode up to the lake in July, on dismounting I hurried to the shore and swept the lake eagerly with my glass. Nothing was to be seen on the opposite shore or below, but up at the head of the lake, under the glacier, with its ice cascades



Photograph by E. R. Warren.

FIG. 36.—Canada geese.

and waterfalls, sitting quietly in a beautiful family group were the old and young. They evidently saw us as soon as we saw them, for they quickly vanished. To get another sight of them, we spent an hour forcing our way through the dense chaparral bordering the lake and working across slippery snowbanks to a steep white slope, ending only at the edge of the water. Then across the lake we discovered white spots—five or six the glass revealed, the young about half grown—close along the shore with green chaparral-covered mountain slopes and snowbanks above them—quite a different setting from those we had been watching in the Washington Zoo in June!

Another family was seen by Mr. and Mrs. Yard from the steamboat on St. Mary Lake near the narrows—two old geese and two

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grayish young about the size of ducks, while at the head of Glenn Lake, under the glacier, when Mr. Bailey flushed the loon he also saw a group of six geese. A nest was discovered June, 1915, by Mr. Gird on a hummock of an old beaver dam between the two St. Mary Lakes. In 1887 Dr. Grinnell found that the southbound geese reached St. Mary the last of September and were very abundant there all through October, some of them staying into November.

When we were camped on the Swiftcurrent, a mile below Many Glaciers, early in August, on walking across the horse pasture near sunset one evening, overhead came the stirring honking of geese, the bugle call that in spring sounds the knell of winter and quickens the pulses with its prophecy of spring. Six of the great broad-winged birds came flying abreast through the sky. They were going out to the flats to feed, and after sunset came flying back, disappearing up toward the glaciers.

While some of the geese winter as far north as British Columbia, others go as far south as the Gulf of Mexico. On the return north this year large flocks passed over Lake McDonald in March, many of them stopping on the lake, which was then partly frozen over. On April 12, Mr. Bailey saw a pair on the North Fork of the Flathead, at the mouth of Camas Creek, said to have been there for a week or more and supposed to have a nest. Several other pairs were seen along the river above Logging Creek, and they are said to [illegible] habitually along the river.

WHISTLING SWAN: *Olor columbianus.*—During the spring and fall migrations, Mr. Stevenson says, whistling swans are seen at the Swiftcurrent lakes almost every year. At Lake McDonald, in April, 1918, Mr. Bailey was told that numbers of swans went over the lake in March, and a few stopped in the open water.

TRUMPETER SWAN: *Olor buccinator.*—In October and November, 1887, Dr. Grinnell found trumpeter swans—largely young of the year—abundant at the extreme upper end of the Lower St. Mary Lake, and, as he says, "these, like most of the geese when they started south, were headed in a southwesterly direction and would thus have crossed the park, it seems safe to include the splendid birds, now practically extinct, in the list of the birds of the park."

Order HERODIONES: Herons, Bitterns, etc.

Family ARDEIDÆ: Herons, Bitterns, etc.

BITTERN: *Botaurus lentiginosus.*—While the bittern is a bird that is easily overlooked except by the saunterer along quiet streams and the leisurely explorer of moist meadows, sloughs, and marshes, its voice

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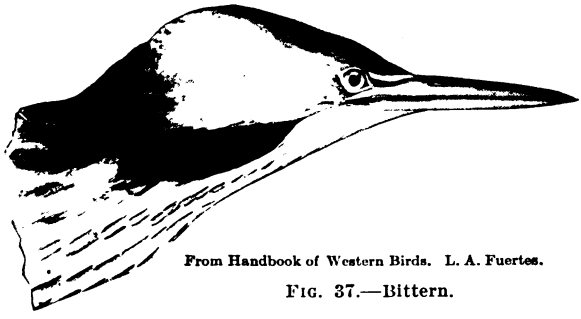
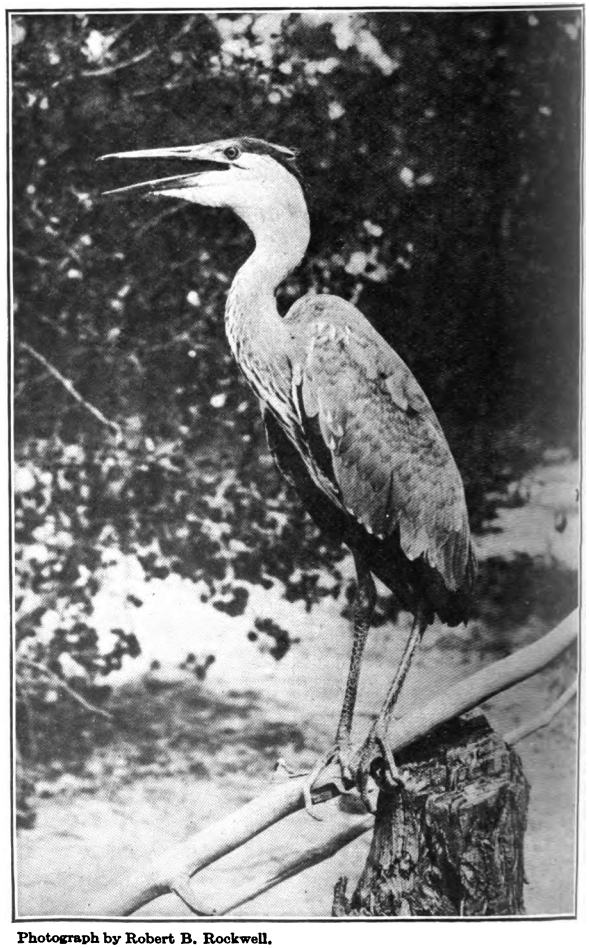
and habits make it too interesting to miss. Its famous vocal imitation of an old wooden pump once heard will be recognized even in the dead of night, and its imitation of stake driving in a bog is so good that it is known not only as the prairie pump but the stake driver. Its brown streaked form will generally be seen from the back as at one's slow approach it rises from a reedy slough or stream bank, and with a deliberate, casual air silently crosses to the next cover, when it quickly drops out of sight. If come upon suddenly, as by a noiseless canoe, instead of taking flight it turns its protectively colored front toward you, assuming one of the wonderful attitudes so often found among protectively colored insects. Pointing its bill to the sky, with long, slender body held erect and motionless, it might well pass for one of the reeds by which it is surrounded.



From Handbook of Western Birds. L. A. Fuertes.

FIG. 37.—Bittern.



Photograph by Robert B. Rockwell.

FIG. 38.—Young great blue heron.

It is good to hear that even in this mountain park there are abundant opportunities for discovering it. The best places to look seem to be on the low, wet land

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Courtesy of National Association of Audubon Societies.

SORA RAILS.

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on the west side of the mountains, where many birds unknown in other parts of the park may be found. Here, as Mr. Gibb says, "in slow water where there are rushes," as in McGee Meadow, and along Camas, Dutch, and Indian Creeks, and the North Fork of the Flathead, bittern have been seen and may well be looked for. But just outside the east side of the park, near Browning, in 1895, Mr. Bailey and Mr. Howell heard one pumping.

GREAT BLUE HERON: *Ardea herodias herodias.*—A sight of the great blue heron, like that of the bittern, is one of the rare pleasures offered the leisurely explorer of the park, and one look at the blue figure standing erect on the edge of a lake or suddenly bending low to spear a fish may well become a cherished memory.

Order PALUDICOLÆ: Cranes, Rails, etc.

Family GRUIDÆ: Cranes.

SANDHILL CRANE: *Grus canadensis mexicana.*—Notes on the summer occurrence of cranes are now matters of park history. In June, 1895, Messrs. Bailey and Howell reported several heard both day and night on June 12, 13, and 14 on the prairies near Midvale; and they added that one pair flew down quite close to camp. In 1899, Mr. Bryant found old nests with eggshells in them on McGee Meadow near Camas Creek. He also found one in a bog on Whitefish Mountain when hunting ducks. He saw a head with pink on it and then saw the bird fly off. About twenty years ago Mr. Lewis saw two sandhill cranes standing out on the prairie on the North Fork of the Flathead. Not unnaturally, when he first saw the tall birds at a distance, he "thought they were people." Mr. Stevenson has been told rather recently of a nest in a marsh in the St. Mary Valley below the park.

At present the park records are restricted to rare migrants flying over, as two seen by Mr. Gibb in May, 1917, at Sherburne Lake. If it were not too late the protected prairie patches on the edges of the park might still recall these original, fantastic birds whose presence adds so much to any locality; but, associated with the days of the Indians on the plains, they, too, belong to "a vanishing race."

Family RALLIDÆ: Rails, Coots, etc.

SORA RAIL: *Porzana carolina.*—Another delightful bird has been added to the possibilities of the close observer in the park by Mr. Bryant's record of the sora in McGee Meadow, a few miles west of Lake McDonald, and its jubilant descending chromatic scale should be listened for in all suitable marshes. An Indian legend attaches to the sora as one of the birds called crane's back, because it is supposed to adopt the easy method of migrating on the back of the crane.

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COOT: *Fulica americana.*—While the coot—recognized always by its slaty body, black head, and white bill, as by its loud and varied cackling talk—is not a common bird in the park, and neither Mr. Bryant nor Mr. Stevenson have found its nests, there are records from a number of localities on the lower edges of the park—notably Sherburne Lake, the Lower St. Mary, Browning, and Belly River on the east, and Lake McDonald, Camas Lake, Mud Lake, and the North Fork of the Flathead on the west.

When at Lake McDonald April 21, 1918, Mr. Bailey found coots numerous, "often in flocks of from twenty to a hundred." On the next day, when the lake was rough, only two were seen, and these were "up under the bushes on the shore running about like quail."

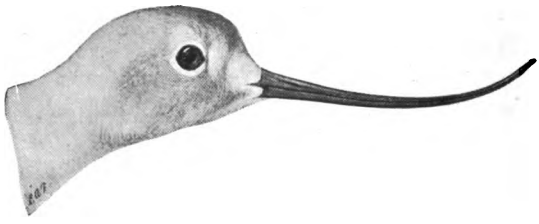
Order LIMICOLÆ: Shorebirds.

Family PHALAROPODIDÆ: Phalaropes.

NORTHERN PHALAROPE: *Lobipes lobatus.*—Mr. Bryant reports that the northern phalaropes are seen in fall on the high lakes. Miniature ducks, as they have been called, the dainty little gray and white birds may be known by their slender necks, delicate forms, and the habit of spinning around or darting to right and left to pick up insects from the surface of the water.

Family RECURVIROSTRIDÆ: Avocets, etc.

AVOCET: *Recurvirostra americana.*—Mr. Bryant and Mr. Gibb have both seen the large, pale cinnamon and white Avocet, with its long slender recurved bill, during migration; and Mr. Bryant says that while it is rare, it visits the prairie patches along the North Fork of the Flathead.



From Handbook of Birds of the Western United States.

FIG. 39.—Avocet.

Family SCOLOPACIDÆ: Snipe, Sandpipers, etc.

WILSON SNIPE: *Gallinago delicata.*—On June 11, 1895, Mr. A. H. Howell found the Wilson or jack snipe six miles west of Browning, and Mr. Bryant thinks it breeds in the park; so its probings—holes in the soft mud—should be carefully looked for in swamps and meadows. As it feeds largely at night and is so protectively striped that it is well hidden in the grass in the day time, it may easily be overlooked unless almost stepped on, when it springs into the air and darts off with baffling zigzag flight. Its song, erratic as its flight, is often given high in air from rapidly vibrating wings.

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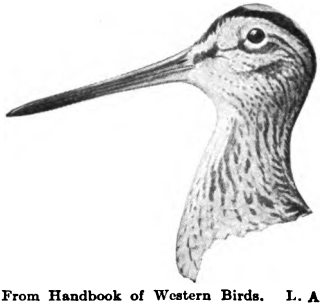
PECTORAL SANDPIPER: *Pisobia maculata.*—In fall when on its way between Alaska and South America, the pectoral sandpiper, with black rump and upper tail coverts and neck and breast closely streaked, has been found by Mr. Bryant in the higher parts of the park, notably at the head of Dutch Creek near the snow and ice, and at such lakes as Iceberg Lake with its large glacier.

GREATER YELLOW-LEGS: *Totanus melanoleucus* (*?*).—One of the yellow-legs is a rare migrant in the park, and Mr. Stanford thinks it is the greater. As the bird may be seen on its way south in July it is well to watch for it and make sure of its identity. The white rump and tail mark it as a form of yellow-legs, while the size determines which—the greater being from 12 to 15 inches long, its bill about 2¼, and its exposed leg bone 2½ inches or longer.

WESTERN SOLITARY SANDPIPER: *Helodromas solitarius cinnamomeus.*—The solitary, which is to be looked for in the park on its early fall migration, may be distinguished from other sandpipers in the field by its dark color, black wings, and shrill note. Mr. Bryant reports it from the valley of the North Fork of the Flathead, and Mr. Bailey on August 14 noted four or five a short distance north of the Alberta boundary line.



From Handbook of Western Birds. L. A Fuertes.

FIG. 40.—Wilson snipe.

UPLAND PLOVER: *Bartramia longicauda.*—Another rare, delightful bird to be looked for on the prairie patches of the North Fork of the Flathead is the gentle upland plover, whose sweet bubbling notes from the sky are heard less and less as the years pass. On the plains east of the park the curlew and plover are both occasionally found, and in June, 1895, two pairs of plover were seen by Messrs. Bailey and Howell near Browning.

SPOTTED SANDPIPER: *Actitis macularia.*—The sandpiper seen commonly along the lakes of the park, trotting over the pretty red and green pebbles, and curving out from the shores, skimming low over the water, showing a white line down the wing, is the same little tip-up we have always known on river bank and ocean beach, and its sweet *peet-weet*, *peter-weet* has a strangely homelike ring under glacier-clad mountains. On Gunsight Lake, beside the ruin of the avalanche-wrecked chalet, I found the meager nest of one of the gentle birds, and when the young hatched watched the mother tenderly sheltering them from the cold wind sweeping down from the mountain. A pair on the Belly River near the International Boundary line were so excited by our advent that they, too, doubtless

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had callow young hidden on the banks of the curving river. Grown young were seen along beaver ponds in various places, all new and fresh, plump, snowy-breasted little fellows with the grayish suffusion on the chest at the bend of the wings.

CANADIAN CURLEW: *Numenius americanus occidentalis.*—In the early summer of 1895, Messrs. Bailey and Howell reported the brown-streaked curlew with the long decurved bill not only from the plains, but the St. Mary River, and once from the Upper St. Mary Lake. Several pairs were seen about June 8.

Family CHARADRIIDÆ: Plovers.

BLACK-BELLIED PLOVER: *Squatarola squatarola.*—A mounted specimen of the black-bellied plover with the minute hind toe, in fall plum-

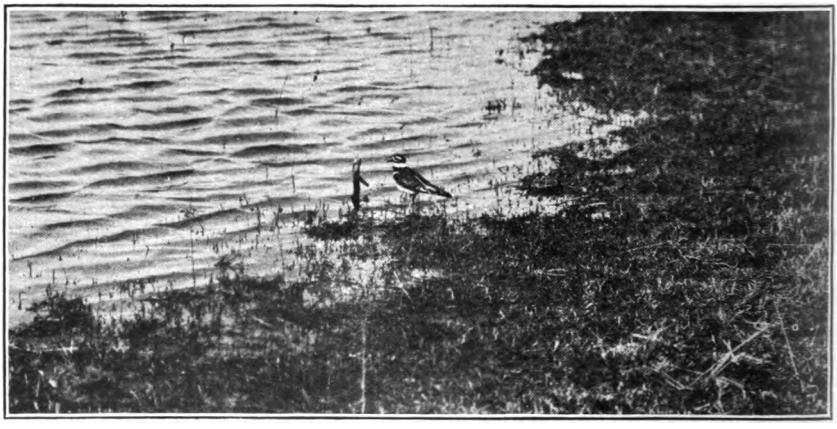

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FIG. 41.—Killdeer.

age, was seen by Mr. Bailey in the collection of Mr. Frank F. Liebig, at Kalispell. During a cold storm it was found helpless and chilled on Swiftcurrent Pass, and on being carried home by Mr. Liebig, lived several months on bread crumbs and flies.

KILLDEER: *Oxyechus vociferus vociferus.*—Though the killdeer—recognized on the wing by its familiar *kill-deé, kill-deé*, and on the ground by its two black chest bands, white forehead and collar, and in disappearing by its ochraceous rump patch—is not common in the park, it is reported from a number of localities in the low country. Mr. Gibb says it breeds at Sherburne Lake, and Mr. Bryant reports it from the valleys of the north and middle forks of the Flathead, while Mr. Gird adds Belly River and the McDonald Lake country. At McDonald Lake, one was seen by Mr. Bailey April 21, 1918, flying along the shore.

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Order GALLINÆ: Gallinaceous Birds.

Family ODONTOPHORIDÆ: Bob-whites, etc.

BOB-WHITE: *Colinus virginianus virginianus.*—The bob-white of the eastern lowlands seems a strange bird to find in Glacier Park, but it has been introduced into the Flathead Valley, and Mr. Bryant says has followed up the north and middle forks. Mr. Stevenson has seen "a flock of twenty or more at Swan Lake, in the heart of a wooded area at least 20 miles from the grain fields," and is inclined to believe that the quail stray into the park at times, not only on the North Fork but near Belton.

Family TETRAONIDÆ: Grouse, Ptarmigan, etc.

RICHARDSON GROUSE: *Dendragapus obscurus richardsoni.*—The large sooty grouse which bursts away noisily from before your pack train as you climb up through the forest is common throughout the heavily timbered higher regions of the park, and when camping in the mountains many broods will be met with. Up Midvale Creek, back of Glacier Park Hotel, early in July we saw our first bird of the season—an old hen, probably just off the nest, walking quietly along in the grass. She cocked her head, tweaked her tail, and walked quickly away on finding herself discovered, but stood still and did a little observing herself when talked to reassuringly. Two of her feathers, one the double kind that give the northern grouse warm body cover, were found in a scooped-out hollow in the trail, showing where she had been dusting. About two weeks later, on the Sexton Glacier trail, as we rode out of the dark woods the peeping voices of young were heard, and as the first horse shied a big mother grouse flew conspicuously into the top of a low evergreen, while her brood, circling out on widespread curving wings like young quail, disappeared under cover. Early in August, on the Swiftcurrent, an old grouse and seven half-grown young, finding our camp nearly deserted, walked calmly past the tents and under the kitchen awning on their way to the creek. On reaching it the mother flew across, calling the brood till they followed, when they all walked off toward the blueberry patch in the pine woods. On our way to the Canadian boundary a number of broods of various sizes were flushed in the mountains.

In the breeding season the males may be heard giving their ventriloquial hoot from the tops of high trees. The birds nest, Mr. Gird says, on rocky ridges, and when flushed fly down timbered canyons. After the 1st of November he never looks for them in the pine country, for they have gone to the red-fir timber in the deep canyons, he says, where they live on the needles during the winter.

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Mr. Gibb has found them in winter in snow from one to twenty-five feet deep, and says they roost in holes in the snow.

FRANKLIN GROUSE: *Canachites franklini.*—The handsomest grouse found in the park is the small, trim Franklin, the male with his red eye combs, and strikingly black and white banded plumage adapted to the dark depths of the forest. One of them was found by Mr. Bailey in dense lodgepole, spruce, and fir timber on the south fork of Belly River in August, and in April a pair was flushed by him

From Biological Survey.

FIG. 42.—Franklin grouse.

on the north shore of Kintla Lake. The Franklin is found mainly, Mr. Gibb says, in the timber along the principal streams, such as the north fork of Kennedy Creek, and Dr. Grinnell says they live in the thickest timber, in damp, cool situations. In winter they are said to stay up in the spruces and pines and live entirely on the leaves of the conifers.

A brood of three half-grown buffy-breasted and tailless young were seen in the Waterton Valley about the middle of August, wandering around enjoying themselves in deep, soft-carpeted woods of spruce and fir, where they jumped up to pick black honeysuckle berries from the low bushes, or answered their mother's call to come and eat thimbleberries. One of them, which flew up on a branch, also

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From Bureau of Biological Survey.

RUFFED GROUSE.

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passed the time eating fir needles. When surprised by our appearance the little fellows ran crouching down the trail showing a keen hiding instinct, but their mother had little sense of danger. When the young were approached she merely turned her head over and called mildly in soft remonstrance. She was the genuine fool hen of Montana, we were told, whom the Flatheads and the mountain Indians never kill except when in great need of food, as the birds are so tame they can be snared at will, without ammunition; as the Indians say, with string from a moccasin.

The same brood, we supposed, was met with a few days later on the same trail. One of the young was in the trail and the mother was sitting on a log when we came up, but on seeing us she called the little ones into the bushes. When driven out for a better view she climbed a bank adorned with bear grass, dwarf brake, and linnaea carpet, and, stopping under a long drooping spray of Streptopus—under whose light-green leaves hung beautiful bright red berries—she jumped up again and again to pick off the berries. Then, flying up on a fallen tree trunk almost over my head, she sat there looking very plump and matronly and entirely self-possessed, while I admired the white and tawny pattern of her plumage. She sat there calmly overlooking the brushy cover where the young were hidden and showed no disapproval when the three came out and walked a log by the trail. She called to them in soft, soothing tones and they answered back in sprightly fashion. It would have been so easy to win their confidence completely and to watch their engaging ways that it was trying to have to leave them and pass on up the trail.

GRAY RUFFED GROUSE: *Bonasa umbellus umbelloides.*—In the pines and aspen thickets of the eastern slope and also in the dense hemlock woods of the western slope of the mountains, one may look for this handsome brown grouse whose crested head, black shoulder ruffs, and banded fan tail give him an alert appearance, and whose loud sonorous drumming is one of the most stirring sounds of the forest.

"The grouse hatch low," I was told by Mr. Gibb, and broods of young were reported in July from the Cracker Lake trail by Mr. M. T. Berger, from Dead Man's Gulch by Mr. Young, the ranger, and from the Iceburg Lake trail about 4 miles above Many Glaciers by Mr. C. W. Griffing. "Along in September you find them on the lodgepole pine ridges," Mr. Gibb said, and added that they stay both high and low all winter. From April 12 to 22, 1918, Mr. Bailey found them common along the North Fork of the Flathead, many being seen along the trails and heard drumming in the woods. They are the most abundant grouse of the low valley country.

In August between Swiftcurrent Creek and Waterton Lake we flushed a number of them along the trail. On the Belly River

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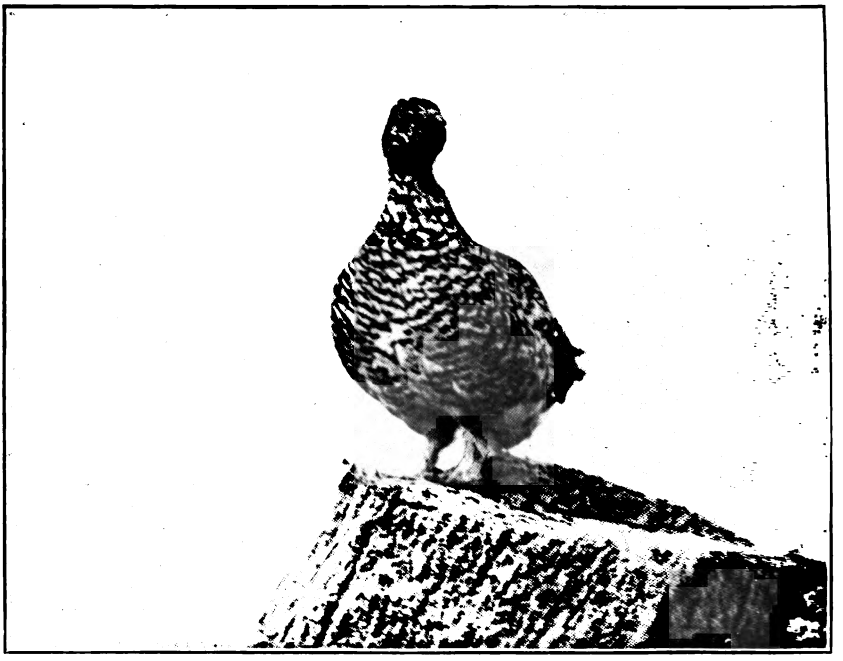
trail on successive days three broods whirred up from almost under the feet of the first horse, making him shy and jump as if he had surprised a bear. One of the first brood, instead of flushing, stood by his guns, trusting instinctively to his protective coloration and attitudes. Drawn up thin and tall in unbirdlike form, the little brown fledgling stood on a branch close to the trail looking greatly scared as we passed. When the second brood sprang up from before us, one of them calmly took his stand down the road right in the way of the prancing horse—a cocky little half-grown grouse with small crest up, ruffs spread, and short tail flashing—sword drawn across our path! As we rode down on him he flew to his brothers in the cottonwoods,



Photograph by E. R. Warren.

FIG. 43.—Female ptarmigan in summer.

but a flicking fan tail that we caught sight of may have been his, venting his last bravado. As we sat on our horses listening to the low conversational notes of the brood, their mother, showing her adult tail band, gave a low purring call and led them off—she would take no more chances with her adventurous spirits! The third family which we surprised near the Canadian boundary line had no bold knight errant to stay us, and the mother, crouching low in decoy, ran off on one side of the road while the brood dispersed on the other. Two days later an old cock, disturbed when dusting himself, stood his ground valorously. To be sure he had lost his tail, but he spread his black epaulettes with great effect as he strutted off through the lodgepole pines.

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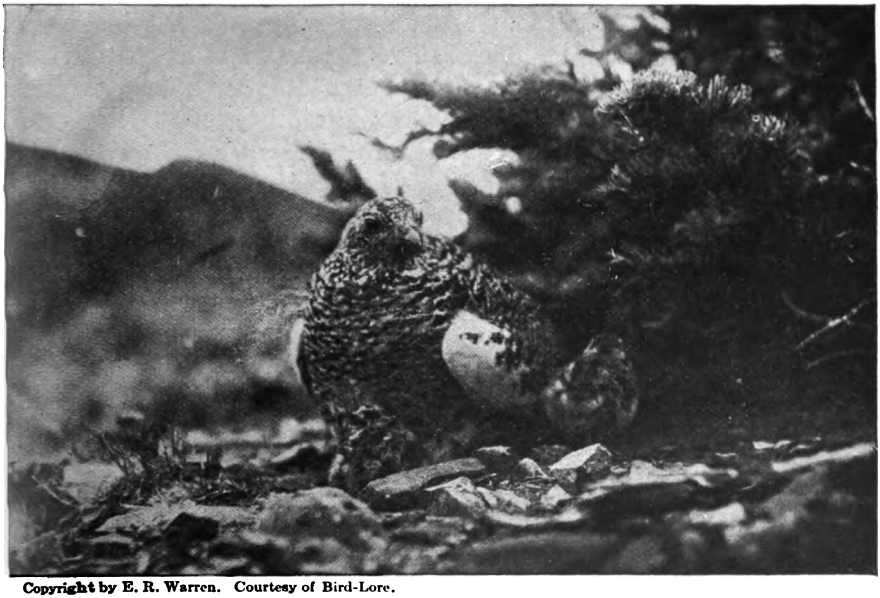
SOUTHERN WHITE-TAILED PTARMIGAN: *Lagopus leucurus altipetens.*—One of the most interesting birds of the world, whose Arctic-Alpine habitat makes its acquaintance impossible for most of us, in Glacier Park is found close to the trails frequented by the tourist, where a half hour's walk from a chalet may afford a study whose intimacy is limited only by the patience of the observer. As I had hunted vainly for ptarmigan over cloud-swept ridges in New Mexico, it was doubly exciting to be told of a nest on the Granite Park trail "in the grass near the trail by the first snow bank." When we got there the brood had apparently gone, but as we crossed Swiftcurrent Pass Mr. Bailey pronounced the slopes on the south side "ideal ptarmigan slopes," and so, after our dinner at



Copyright by E. R. Warren. Courtesy of Bird-Lore.

FIG. 44.—Mother ptarmigan and chicks.

the chalet, when he returned to climb the peak on the north side of the pass, I accompanied him to make my way up the slopes of the south peak looking for the birds. Skirting an acre of snow, I zigzagged back and forth over the face of the "ideal ptarmigan slope," open to swift-winged enemies, but by its broken surface and variety of colors affording a safe background for ptarmigan in the mixed summer plumage. Even the wide expanse of slide rock was broken by occasional dwarf evergreens and streaks of grass, and many of its red shales were patterned with lemon-yellow or curly-brown lichen covering deep ripple marks. Above the main mass of slide was a wide grassy slope of soft yellowish brown tones that would soon match the brown of the ptarmigan. Above this the narrow

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outcropping ledges and stony slopes made a terraced Alpine flower garden, one of the gardens that are among the choicest of all nature's lavish gifts to man; this one, with its maturing seed harvest, providing veritable grain fields for hungry bird and beast. Some of these Alpine terraces were fairly white with the lovely low, wide-smiling *Dryas octopetala*. In other places the beds of white were spotted with the pink mossy cushions of *Silene acaulis*, while in still others there were clumps of dwarf sedum, whose dark-red flowers and seed pods contrasting strikingly with their pale green leaves might well attract the attention of furry vegetarians locating granaries, and make good feeding grounds for the Arctic grouse. Under a protecting ledge that faced the morning sun and had a dwarf fir in its doorway, a ptarmigan feather told of safe pleasant hours on the mountain side. Sometimes they choose such places for the nest, it is said; but not a bird could I discover.

Meanwhile on the opposite mountain, the diminishing figure climbed till it became a hair line on the crest of the bare dome, when, turning my glass to sweep the rocky wall below I caught sight of a mountain goat, with short tail up, walking along the ledges as if he had been disturbed by noises from above and was getting out of the way. Walking along deliberately at first, he finally made a jump and disappeared, not long after which a pack train returning to Many Glaciers also disappeared down the first angle above the zigzag.

Hoping to discover the ptarmigan above, I climbed on till the glacier-carved walls on the east framed a view out over Swiftcurrent, the Sherburne Lakes, and the open plains beyond, while on the west a sublime view unfolded—snow-clad mountain masses with the full sun on them uplifted to the sky. But there were no ptarmigan. At last, discouraged, I retraced my steps and had gone about halfway down the steep, stony slope of the mountain when—what was that sound? Listening, I caught it again—the softest possible call of a mother ptarmigan! There she stood, only a few feet from me, hard to see except when in motion, so well was she disguised by her buffy ground color finely streaked with gray. A round-bodied little grouse with a small head, she was surrounded by a brood of downy chicks, evidently just hatched, as their bills still held the sharp projection for pipping the shell. Preoccupied with the task of looking after her little family, as I talked reassuringly to her, she ignored my presence. Nothing must hurry the unaccustomed little feet, nothing must interfere with their needed rest. Talking softly she gradually drew the brood in under her motherly wings and sat there only a few yards from me, half closing one eye in the sun and acting oblivious to all the world. Once the downy head of a chick appeared between the fluffed-out feathers of her breast, and once she preened her wing

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so she showed the white quills remaining from the white plumage of winter.

Her bill opened and her throat palpitated as if she were thirsty, as she sat brooding the young, and I imagined that the last hours of hatching high above water had been long and trying to the faithful mother. But though water—clear cold mountain brooks—were below, no need of her own could make her careless of her little ones. Keeping up a motherly rhythmic *cluck-uk-uk*, *cluck-uk-uk*, interlarded with a variety of tender mother notes, she led them down by almost imperceptible stages, slowly, gently, carefully, raising a furry foot and sliding it along a little at a time, creeping low over the ground with even tread, picking about as she went, while the little toddlers gradually learned the use of their feet. Like a brood of downy chickens, some were more yellowish, some browner than others, but they all had dark lines on head and body giving them a well-defined color pattern. Peeping like little chickens, while their mother waited patiently for them, they toddled around, trying to hop over tiny stones and saving themselves from going on their bills by stretching out wee finny wings. As chickens just out of the shell instinctively pick up food from the ground, they gave little jabs at the fuzzy anthers of the dryas, little knowing that pollen was the best food they could find, a rich protein food from which the bees make bee bread to feed their larvæ. Did Nature teach them also to find a starch as she does the bees, who add honey to bee bread to produce a balanced ration? It would be interesting to determine.

As we all made our way slowly down the slope, I watched Mr. Bailey's descending figure on the opposite slope and when he reached the pass, signaled for the camera. The addition of a second sympathetic observer did not disturb the old mother ptarmigan, and she allowed a large part of a film—most unfortunately spoiled by a dragging shutter—to be taken at decreasing distances until within the shortest possible focus. When one of the chicks was picked up by Mr. Bailey it sat in his open hand unafraid and unnoted by its mother, but when a second was reached for more obviously, she gave a low hiss and drew her white wings down threateningly at her sides, so, unwilling to trouble her, we hurriedly left; but, on slipping back in a few moments for a last look, found her composedly brooding her little ones.

The next day when Mr. Bailey went to look for mammals, I returned to look for my ptarmigan. Thinking to find them where I had left them or higher, I climbed up through the flower gardens to the foot of the cliffs crowning the mountain, where four-footed mountaineers had climbed before me. From the foot of the cliffs on the east, I looked down on the seamed face of Swiftcurrent Glacier.

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and on the west, as the cool, invigorating air swept across the slope, looked off on the row of mountain peaks seen from Granite Park, standing out wonderfully in the full morning light, their sides veiled in rich purple and buffy atmosphere, the white of their snowy summits repeated ethereally at higher levels by cloud caps dissolving in the pale blue sky.

But though an occasional siskin might be heard passing over, not a ptarmigan was to be found on the slopes, and it finally came over me that it was illogical to look for them so high. They must have water, and at present were quite unequal to mountain climbing. I should have looked at water level. Hurrying down, I passed the wind-flattened evergreens and snow banks, and as I came to the first open water came face to face with my lovely little family. Yes; there were five; they were my brood. As I greeted the mother I noticed appreciatively her selection of a drinking place for her callow young, for the water seeping down through the spongy grass trickled over a shallow rocky saucer just the right depth for downy chicks. As I watched, the old grouse drank thirstily herself, as if enjoying her release from the dry slopes above. The soft sod gave much easier footing than the rocks, and a few hours of practice with feet had told remarkably in the skill of the brood, for they wobbled much less and ran around in a sprightly way, sometimes straying a rod or more from their guardian.

She appeared a little nervous out in the open, and suddenly turning her head on one side to look up gave a prolonged low call. The brood, which had been picking around in plain sight, at the alarm simply vanished. As nothing came and the warning was not repeated, one after another the little forms became visible again right under my astonished eyes. One little tot, I was amused to see, had been sitting down back to a stone that helped make him invisible. Meanwhile the sky, so far as I could see, was vacant of menace. Had the wise old mother been giving fire drill? Up the trail came a party from Many Glaciers, led by its big-hatted guide, but they had not alarmed her, for, though passing only a rod or so from the family, she barely moved. And still, while her little ones strayed off or fed around her, as she talked to them she kept looking up nervously. Did she feel that they were too conspicuous out in this open grass? Would it be too easy to pounce down and carry one off? Whatever her argument, or instinct, she edged up onto a ledge and stood back against a rock, where she was less conspicuous, and after pluming herself gathered her little ones under her wings. As I glanced down over the rocks below the pass I started, for there were three mountain sheep—big horns, with brownish bodies and white rump patches—standing on the flat rocks at the edge of the cliffs beyond the trail. Could the old ptarmigan, with her keener

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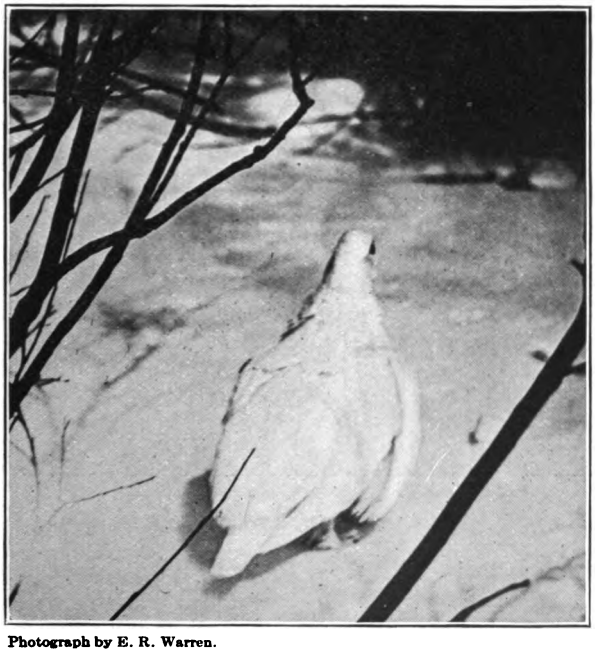
senses, have heard them as they came down the wall of the mountain? She sat there all unconscious now, while they, looking thin and shorn compared with the shaggy white goats, stamped and kicked at the flies and put down their big-horned heads. Presently the three started over the edge of the cliff, and after a few moments a ewe, with shorter, straighter horns came down and followed along after.

All this time the old ptarmigan with feathers puffed out sat on her rock about ten feet from me. Once a little head peeped out from among the feathers, but all was quiet, so quiet that I could hear the water trickling through the grass. When well rested the downy



Photograph by E. R. Warren.

FIG. 45.—Ptarmigan in winter.

chicks came out and began to peep and run around again, one of them coming within five or six feet of me without question from his mother, for we were old tried friends now.

But what were they finding to eat? The dryas was higher up on the mountain. As I questioned, I discovered one of the little tots in a bed of dwarf willows whose pinkish stamened catkins stood about an inch from the ground. Making a quick run at a catkin the little fellow gave a jab at the fuzzy anthers! Droll little chicks! Apparently their mother approved of their diet if she did not understand dietetics, for as they went busily about among the flowers and grasses, she left them to their own selection. But it was high noon and time to go back to the chalet. When I returned in the afternoon a storm

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was coming and my little family had apparently gone to shelter—possibly under a dense mat of evergreen or into a safe cavern under a ledge, for they are said to roost along the edges of coarse rock slides under dwarf evergreens—and greatly to my disappointment, I never saw them again.

Another brood of five downy chicks was found by a member of our party on the crest of the mountain opposite, but in this case there was melting snow near at hand. A brood of six larger young was found near the top of Piegan Pass in August, also in easy reach of water, and where there were bunches of red sorrel whose seeds the young were eating. On Kootenai Pass still later the turkeylike *kerp*, *kerp*, of a mother ptarmigan calling her brood was heard in

Photograph by E. J. Cameron.

FIG. 46.—Sharp-tailed grouse.

passing. Near Blackfeet Glacier feathers were found, and at Gunsight Pass a lineman reported seeing the birds where the open slopes afford abundant food.

In winter the ptarmigan feed on willow buds and the evergreen leaves of the dryas, Mr. Stevenson tells me. He has found them with their snow white winter plumage complete the last of September, and in winter has seen them on the mountain tops, "each bird sitting in the snow lodged behind a rock on the bare, rocky, wind-swept barrens." After hard storms, he says, they may also be found at the bases of the mountains, and one flock was discovered in the willows above Sherburne Lake during a blizzard. But though a few may occasionally be driven below by stress of storm, the ptarmigan live on the mountain tops, where the mountain sheep and goats make their homes, and where they, too, are nourished by the hardy, dwarf, Arctic-Alpine flora. Having had little to fear from the hand of man, these gentle birds offer one of the most delightful of all experiences to the bird lover, the opportunity to study their natural home life close at hand.

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COLUMBIAN SHARP-TAILED GROUSE: *Pediœcetes phasianellus columbianus.*—Birds of the plains and the willowy ravines of the foothills, the Columbian sharp-tails though rarely, if ever, breeding in the park, are sometimes very plentiful along the eastern boundary, Mr. Stevenson says, in the winter months coming up the open ridges well into the park, and being especially numerous between the two Kennedy Creeks and below Chief Mountain. The heavy rain and flood of the year 1908 killed off the greater part of them, but in January, 1912, between the two Kennedy Creeks, Mr. Stevenson saw flocks of literally thousands feeding on the low flower buds of the water birch. That year they were common all along the park line from Cut Bank County to the Canadian line. They used to be in the Flathead Valley and the small prairies on the North Fork, Mr. Bryant says, but now are practically gone. Three flocks wintered in the open country near the Adair ranch just south of Logging Creek in 1915–16, but they left in the spring and no others have been seen.

Order COLUMBÆ: Pigeons.

Family COLUMBIDÆ: Pigeons.

WESTERN MOURNING DOVE: *Zenaidura macroura marginella*—The familiar mourning or turtle dove, with the graduated tail, is a bird of the lower levels rarely seen in the park. Mr. Stevenson has seen only two in 17 years. On October 30, 1887, Dr. Grinnell saw one on the Lower St. Mary Lake, and in 1895 Messrs. Bailey and Howell saw a pair at St. Mary River, and two near Midvale. Mr. Gibb has seen the dove around Adair near the North Fork of the Flathead in summer, and Mr. Lewis speaks of seeing it at Lake McDonald.

Order RAPTORES: Birds of Prey.

Family CATHARTIDÆ: Vultures.

TURKEY VULTURE: *Cathartes aura septentrionalis.*—In the fall of 1885 Dr. Grinnell found the turkey vulture with the bare red head and neck of a turkey gobbler common over the prairies of the St. Mary Lake region, and in 1895 Messrs. Bailey and Howell saw two over the St. Mary River; but Mr. Gird says that, like the eagles, they have been getting caught in fur traps and so done away with. In a fifteen-year residence Mr. Lewis says he has seen only two, and those outside the park. Mr. Bryant has seen the vulture about the prairie patches on the west side and has mounted some killed less than ten miles from the park, but says that the bird is almost unknown now, especially on the west side.

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Family BUTEONIDÆ: Hawks, Eagles, etc.

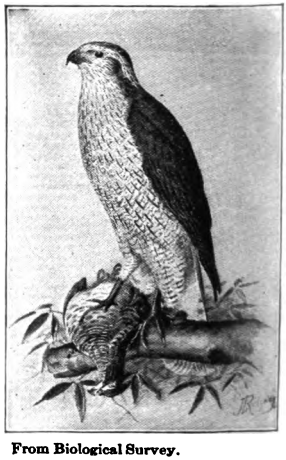
MARSH HAWK: *Circus cyaneus hudsonius.*—The mouse hawk, as it is known locally, is easily recognized by its white rump patch as it beats low over meadows, marshes, and beaver ponds, hunting for small mammals. While restricted to the lower levels, it is reported from Sherburne Lake, Lake St. Mary, and the North Fork of the Flathead. Several were seen by us in the Belly River country, at Waterton Lake, the Reynolds Lakes, and along the Kootenai Trail.

From Biological Survey.
FIG. 47.—Sharp-shinned hawk.

The marsh hawk nests on the ground, and when opportunity offers it is a peculiarly interesting bird to study and photograph.

SHARP-SHINNED HAWK: *Accipiter velox.*—The long-tailed little sharp-shinned hawk darts about, picking up birds or small mammals with dextrous ease, but occasionally he finds his match. One morning in August, as the sun was shining over the garden wall at our Granite Park camp and the small birds were flying around among the tall firs, Mr. Bailey saw a band of Clark crows and Oregon jays come into the white-barked pines. "Suddenly," he said, "the ground squirrels began to chirp in a low tone quite different from their usual alarm note, and a sharp-shinned hawk dashed across from one tree to another in pursuit of an Oregon jay of his own size." Such temerity was not to go unpunished, and the jay, with loud squawks, promptly chased him back to another tree, a Clark crow joining in "with harsh cries and widely flapping wings."

A few hours later, as we were crossing Swiftcurrent Pass, we saw a sharp-shin skim low over the ground and make a quick dive at a ledge of rock, when a ground squirrel with a sharp squeak dodged back out of his reach. After the hawk had disappeared, the half-grown ground squirrel came out and loudly celebrated his escape with warning whistles to his brothers.



From Biological Survey.
FIG. 48.—Goshawk.

COOPER HAWK: *Accipiter cooperi.*—One of the Cooper hawks, similarly marked but a size larger than the sharp-shinned, was seen by Mr. Bailey on August 9, flying over the low peak adjoining Chief Mountain. The hawk was also reported by Mr. Frank M. Stevenson, from the Sherburne Lake region.

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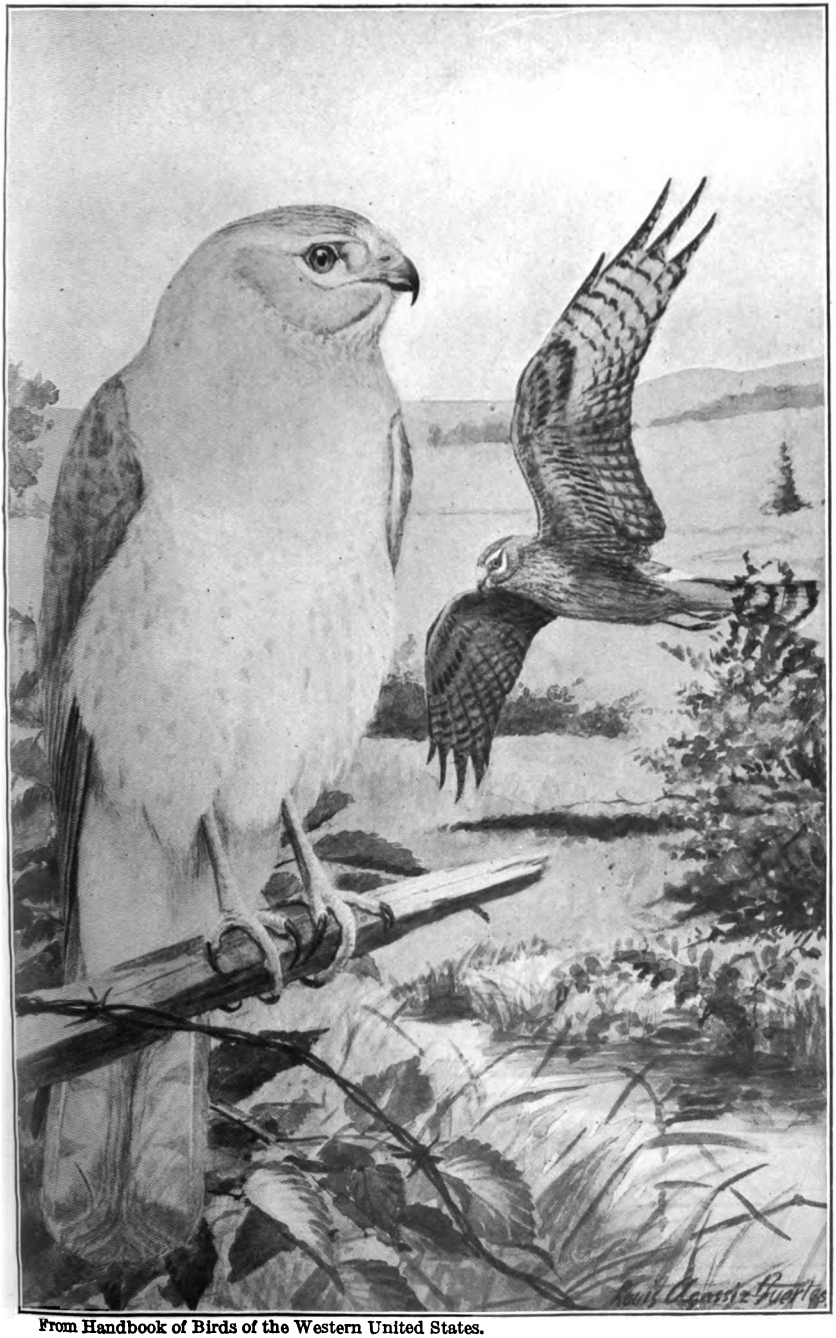

From Handbook of Birds of the Western United States.

MARSH HAWKS.

Male. Female.

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WESTERN GOSHAWK: *Astur gentilis striatulus.*—The destructive goshawk, which lives largely on poultry in settled regions and on game birds in the mountains, may be recognized by its bluish back and swift flight, which give it the name of blue darter. A hawk seen from a distance, at the base of Grinnell Mountain, was apparently a goshawk. A mounted bird from Lake McDonald is in the collection of F. F. Liebig, of Kalispell. One taken for the eastern form by Mr. H. C. Bryant, of California, was seen July 23 on the trail between Reynolds Creek and Piegan Pass.

From Biological Survey.

FIG. 49.—Red-tailed hawk.

WESTERN RED-TAIL: *Buteo borealis calurus.*—The widespread rufous fantail of this hawk seen overhead, as he circles high in the sky giving his high-pitched squeal, identifies him anywhere. While the red-tail is one of the most beneficial hawks, waging an incessant warfare on injurious mammals, such as ground squirrels and mice, it is often called henhawk or chicken-hawk and killed through popular prejudice, greatly to the detriment of the ranchman.

In 1885 and 1887 Dr. Grinnell found it common among the foothills and on the plains of the St. Mary region, but only two were seen by us in the park during the summer, one on the Swiftcurrent, below Lake McDermott, and one over the flats of Belly River; but on April 19, 1918, Mr. Bailey saw one on the road just west of Dutch Creek. Another was seen in 1913 by Mr. E. R. Warren on Bison Mountain.

From Biological Survey.

FIG. 50.—Swainson hawk.

SWAINSON HAWK: *Buteo swainsoni.*—Mr. H. C. Bryant, of California, reports having seen a Swainson several times "on the open prairie about a mile down the Swiftcurrent River from Many Glaciers," and Mr. E. S. Bryant says the birds nest on Teakettle Mountain on the southwestern edge of the park. One of these prairie-frequenting hawks was seen by us in August on the Belly River flats. As if letting the upcurrent take it, it rose higher and higher, squealing something like a red-tail, till it was only a black line against a white cloud.

SQUIRREL HAWK: *Archibuteo ferrugineus.*—Another prairie hawk, the large squirrel hawk or ferruginous rough-leg, was seen in the

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horse pasture below Many Glaciers. It was a melanistic, blackish, immature bird, with reddish breast, and the characteristic feathered legs. Its presence on a low tree overlooking the field produced a great barking of ground squirrels and chipping of birds, although, had the birds but known it, he was not looking for them, for he lives almost exclusively upon small mammals and reptiles, with the addition of crickets.

GOLDEN EAGLE: *Aquila chrysaëtos.*—Eagles were seen in a number of places, hunting over the sides of the mountains. From St. Mary Lake one of the dark forms was seen moving along the face of Flat-top Mountain; near Many Glaciers, on looking across the green water of Lake Josephine and over the dark conifers of the island, up against the red strata of Grinnell Mountain another large dark form was seen; and near Piegan Pass, at Granite Park, and above Lake Ellen Wilson still others of the great birds were seen as landscape features projected against mountains or diving deep into canyons for their prey.

When we were camping in their country, our guide, Mr. Gird, described some interesting experiences he had had with them: "Once," he said, "I happened to look up and here come an eagle like an arrow. I scrouched—and he didn't go a hundred yards from me when he got his marmot." "An eagle will carry off a kid as he would a marmot," he added. When we were camped on the head of Mineral Creek, pointing to the cliff opposite, he told of a battle he had seen there between a pair of eagles and a full grown mountain goat.

"He was right up there where that stone looks like a goat at the top of that green"—pointing to some timberline dwarfs. "The nannie and the kid had gone over the ridge and he was going when the eagle attacked him. The eagle came and kept swooping down at him till he run into the green. He must have hid in the green—we could see very little white. Then the eagle went away and when the goat came out, he came back with his mate. It was funny to see them work. One would stay up and the other would dive. He would make a little run and when they would come he would rare up and paw at them with his front feet, and then they'd beat it. He was making for that dark ledge"—pointing up. "When they was raising, the goat would make a run for the cliff. When he got to the cliff they couldn't dive at him. They sure did hate to give him up. They sailed round for a long time. It was about this time"—six o'clock—"and he stayed around till nearly dark." Gazing up at the cliffs reminiscently, he concluded emphatically, "The old sport was scared a little bit!"

When men are trapping for mountain lions, Mr. Gird said, they sometimes get eagles. "Royal eagles" he called them, and said that to the Indians they apparently represent force.

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Courtesy of Bird Lore. Photo. by H. W. Nash.

YOUNG FERRUGINOUS ROUGH-LEG.

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Courtesy of Bird Lore. Photo. by H. W. Nash.

YOUNG GOLDEN EAGLE.

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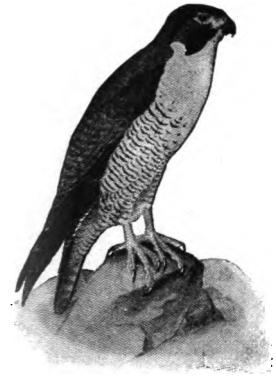
BALD EAGLE: *Haliæetus leucocephalus leucocephalus*.—No bald eagles were seen by us in the park except the mounted specimen at Lewis's, on Lake McDonald. Mr. Stevenson says he has seen only one or two adults in the park, but that the birds are known to nest on the rocky buttes out on the plains east of the park. Mr. Bryant says they also nest on the North Fork of the Flathead. In 1887 three or four adults were seen by Dr. Grinnell in the St. Mary Lakes region.

From Biological Survey.

FIG. 51.—Bald eagle.

As the bald eagle lives largely on fish, taken dead or alive, Mr. Gird says they class him with the vulture. As he said, "He's not the hunter the royal eagle is."

Family FALCONIDÆ: Falcons, etc.



From Biological Survey.

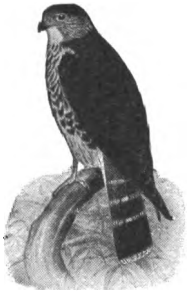
FIG. 52.—Duck hawk.

PRAIRIE FALCON: *Hierofalco mexicanus*.—Near Kootenai Pass, as we rode along the vertical wall of a mesalike mountain mass suggestive of the homes of the prairie falcon, high overhead we were much pleased to see one of the small hawks fly out with its characteristic quick, hard wing beats. It was the only one seen or heard of during the summer, but in the fall of 1887 Dr. Grinnell found it common on the plains and about the Upper St. Mary Lake. When seen near at hand, it may be known by its pale clay brown upperparts, white collar and underparts.

DUCK HAWK: *Rhynchodon peregrinus anatum*.—One of the duck hawks, which rank next to the goshawk as fierce birds of prey, was seen by Dr. Grinnell in 1887, feeding on a female shoveller, on a bluff overlooking Red Eagle Creek during a blinding snowstorm.

PIGEON HAWK: *Tinnunculus columbarius columbarius*.—The pigeon hawk—one of the small bird-catching hawks—was reported from the park by Mr. Bryant.

DESERT SPARROW HAWK: *Cerchneis sparveria phalæna*.—The familiar rufous and brown sparrow hawk, which lives largely on grasshoppers and nests in a hole in a tree trunk, was seen a number of times in the park. An



From Biological Survey.

FIG. 53.—Pigeon hawk.

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adult was seen at Glacier Park carrying a mouse, while a young one sat in a dead tree containing a nesting hole, and a family of young seen in a burn along the Swiftcurrent trail were being fed in a tree top. Two were also seen at St. Mary Lake chasing a goshawk, and one was found at Big Prairie, on the North Fork of the Flathead.

From Biological Survey.

FIG. 54.—Sparrow hawk.

Family PANDIONIDÆ: Ospreys.

OSPREY; FISH HAWK: *Pandion haliaëtus carolinensis.*—A note from the sky, followed by a shadow projected over the green water of Lake Josephine, drew my attention to a large, white-headed, brown-backed bird, white underneath to the linings of its long, outstretched wings. As I watched, higher and higher it rose in the sky until it was no longer to be seen in the blue. Had the osprey wandered across from a distant nest to investigate the fishing? It is said to live throughout the park wherever there are fish and the Upper St. Mary, near Reynolds Creek, the Swiftcurrent above Sherburne Lake, and the southern Waterton Lake all boast ancestral nests.

A fish hawk's or osprey's nest is one of the most interesting ornithological features of the landscape. Built, as on the Swiftcurrent, on top of a broken-off dead tree, where it can be seen for miles around, the great gray mass of sticks grows higher and higher as the years pass, and one who has once made the acquaintance of the family will welcome their return each spring, sure of rare entertainment in watching them rear their young. The nest on the Swiftcurrent, easily watched from the high embankment above the creek, was on a dead limby spruce about 40 feet from the ground and was perhaps 4 feet wide by 2½ feet high.

When I first went to watch the nest from the point on the embankment that I named Fish Hawk Point, one of the parents—let us say the mother—stood on the tip of a tall spruce commanding both nest and surrounding landscape. On Guard, her picture might have been labeled. In the nest white flashes came from the moving young, away in the distant background were seen the forested slope of the moraine, and above, the bare, rocky cliff, gilded by the afternoon light. Down the river the other parent was fishing, his loud peeping *yelp-elp-elp-elp* being heard as he flew, now over the trees, now

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over the lakes, now against the mountain-side, finally disappearing in twinkling white flashes in the distance. As we watched, thinking he had gone, back he came calling, with a fish in his claws, held head-on to cut the air as he flew.

Copyright by Haynes, St. Paul.

FIG. 55.—Nest of osprey.

Early the next morning I took my stand at Fish Hawk Point, where I spent a large part of the day. A parent and both young were standing on the nest on my arrival, one leaning over eating. Presently the parent raised its head and looked over in my direction; then, lifting its wings and spreading them wide, flew straight across

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the creek bottom, full of willow thickets and beaver dams, till it came crying over my head. After careful inspection it circled back and lit on the tip of a spruce spire, the other parent watching from an adjoining tree and crying loudly *yelp-elp-elp-elp*, *yelp-elp-elp-elp*, while the two at the nest at intervals raised their weak young voices. Perched on high spires, the parents made handsome figures, with the sun full on their white breasts and proudly raised white heads, and when they flew about they flapped and sailed beautifully, their brown wings almost shining under the sun.

Photograph by A. C. Bent. Courtesy of Bird-Lore.

FIG. 56.—Two photographs of an osprey and its nest from a distance of 30 feet, the smaller with a 6-inch-focus lens; the larger with a 26-inch-focus lens.

The birds in the thicket below made merry, the siren of a passing automobile stage sounded, and finally one of the parents relaxed its vigilant sentry duty enough to go to the nest for breakfast. After eating its fill it stood on the nest for a long time, its young one, as if quieted by its presence, lying down in the nest for a rest. When I moved there was another inspection and then both parents stayed for some time out of sight from the nest, calling as if they suspected danger and were encouraging the young to leave. At any rate, one of the fledgelings, as if in response, flapped his wings over the nest again and again, his thin *kek-kek-kek* sounding weak, indeed, compared with the strong *elp-elp-elp* of his parents. Presently

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one of the old birds came to the nest, holding its long wings out over the platform a moment in alighting. As if to draw the young, it stayed but a moment, and when it had gone the urge to follow came irresistibly to the more courageous of the two brothers. Standing on the edge of the nest, he raised his wings above it. As he held them lifted there came a beautiful moment when the wind seemed to fill his sails. All the possibilities and joy of flight were in that tremulous moment. Then, with the courage and strength of a creature born to fly, his feet loosened and up he rose above the nest! Thrilled by the poetry of the first flight, I sat spellbound watching him. Would he drop back? No; he had tasted freedom and power. But the wind blew hard in his face, and he was borne back behind the nest tree. Rallying, perhaps in a lull, he flew ahead again. But what should he do out in this limitless space? For a few moments he drifted around aimlessly, and then, quite naturally, having always lived in a tree top, flew down over a spruce spire and, with much flapping of wings and evident perturbation, finally let his feet down and got his balance.

His mother meanwhile had flown to the nest, from which she watched the vagaries of his first flight; but when he lit she flew to the top of a neighboring spire closer by. After an interval, when the two sat like statues on the two spires, the courageous son again sallied forth, this time wandering back almost to the nest and then over near his parent, where he tried to light on a slender, unstable spire. Greatly scared, he flapped his wings, and cried in his weak, young voice for a long time before he could accomplish it; and no sooner was he settled than the wind came and almost upset his balance, making him flutter distractedly—alas for the saints on the point of a needle! The parent, who was on a large stable stub, gave herself a shake that would have precipitated the youngster, and merely looked about with an air of accustomed power. Then, watching her wind-blown wabbling son, she leaned over, looking as if she wanted to help, and—whether with deliberate intent or not—flew off and let him take her stable perch. This was such an improvement that after a time the courageous one actually leaned back and preened himself, as if he had stood on spires all his days. Getting tired, he tried sitting down on his perch, but spires and wide-platformed nests were quite a different matter, and his weary legs wabbled so that he was forced to take wing, flying and circling, till he finally made his way back to the nest. With outspread wings he hovered over it, legs dangling, but at last let himself down—home again for a good rest.

When the timid brother finally got up his courage to leave the nest, he, too, wanted the solid perch, but succeeded only so far as to

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dislodge his brother. Over and over again the round was repeated, the young making short flights, lighting on the solid perch or wobbling on a spire, and then circling back again to the nest. And here, when I had been wondering how they could be fed on spires, it proved that the parents brought the fish to the nest, where they and the young ate in comfort from their broad dining table. During the afternoon the progress of the young was surprising, and before I left I was not always sure that a direct powerful flight was that of a parent, for the young aeronauts were rapidly getting to feel at home in the sky.

Family BUBONIDÆ: Horned Owls, etc.

SHORT-EARED OWL: *Asio flammeus flammeus.*—The interesting short-eared, one of the partially diurnal owls which lives in the open, is reported from the flats, heavy willows, and dense brush of the park.

From Biological Survey.

FIG. 57.—Short-eared owl.

GREAT GRAY OWL: *Scotiaptex nebulosa nebulosa.*—A mounted specimen of the great gray, a diurnal owl of dense forests, was caught in a coyote trap in the park and is now to be seen at Lewis's Hotel. From the concentric rings of gray that make up its facial disk, it is called locally the saucer-faced owl. Mr. Gibb says that it is resident in the park, and Mr. Stanford says he has known of young, scarcely able to fly, being seen north of Kalispell. Mr. Gird reports it from the prairies and the automobile road to Many Glaciers in fall, and Mr. Bailey saw the wing of one at a house on Camas Creek Ridge.

RICHARDSON OWL: *Cryptoglaux funerea richardsoni.*—A mounted Richardson seen at Lewis's was caught in a coyote trap west of the park, but Mr. Bryant says they are common, and trappers catch them in marten traps. Reaching their southern limit in the northern United States, they are interesting owls to watch for. Only 9–12 inches long, their dark brown upperparts are spotted with white, their breast heavily blotched and the belly streaked with dark brown, while the feathered flanks and feet are usually buffy, more or less spotted with brown. As they are so nocturnal that they have been

From Handbook of Western Birds.

FIG. 58.—Saw-whet owl.

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taken in the hand in the daytime, the Eskimos of Alaska have given them the name of "blind ones."

SAW-WHET OWL: *Cryptoglaux acadica acadica*.—Mr. Bryant says that the saw-whet is rare in the park and that the mounted one at

Photograph by Robert B. Rockwell.

FIG. 59.—Screech owl at home in a hollow tree.

Lewis's came from outside the park. In 1895 Messrs. Bailey and Howell reported hearing one at dark on June 1, at the upper St. Mary Lake. As it is a small nocturnal owl of the deep forest it may easily be overlooked.

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MACFARLANE SCREECH OWL: *Otus asio macfarlanei.*—A mounted specimen of the familiar little horned screech owl from 7½ to 10 inches long may be seen at Lewis's. As it is an owl of the low country, its quavering cry should be listened for at night by campers along the edges of the park.

WESTERN HORNED OWL: *Bubo virginianus occidentalis.*—The great horned owl should be looked for in the more open parts of the park. Its nests may be found on old hawk nests, in hollow trees, or in caverns in the cliffs. It is one of the most spectacular birds of the park. On a moonlight night, one has been seen sitting on the bridge over the Swiftcurrent at Many Glaciers, and at many a camp in the mountains the loud hooting has brought a thrill of keen satisfaction to the lovers of the forest.

From Handbook of Birds of the Western United States.

FIG. 60.—Horned owl.

ARCTIC HORNED OWL: *Bubo virginianus subarcticus.*—In the winter of 1916–17, Mr. Bryant reports, so many Arctic horned owls were seen that "it seemed like a flight." Every few years, he says, the owls come in numbers.

SNOWY OWL: *Nyctea nyctea.*—The circumpolar hornless snowy owls, pure white, or white marked with black, some of which come into the United States in the winter, have been seen by Mr. Gird in January and February along the border of the park. In the winter of 1916–17, Mr. Bryant says, quite a number were seen.

HAWK OWL: *Surnia ulula caparoch.*—The hawk owl, which is a medium-sized northern owl, has been found in Montana in summer and should be carefully looked for. Strictly diurnal, it often watches for its prey from the top of a dead tree in bright sunlight, and with swift, hawklike flight pitches down from its high perch nearly to the ground, and after capturing its prey rises quickly again to its tree top. Seen close by, its light face is encircled by a heavy black ring, and its underparts are closely barred.

On the Yellow Mountain ridge, between the forks of Kennedy Creek, on August 9 we saw what Mr. Bailey took for a hawk owl, a

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Courtesy of National Association of Audubon Societies.

BELTED KINGFISHERS.

Upper figure, female; lower figure, male.

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bird with long wings and white spots flying swiftly down from the spires of an old burn. Mr. Bryant has shot it on top of high peaks and thinks that it breeds in the Park. Dr. Grinnell saw one, as he remembers, in 1891 in the St. Mary Lake woods, and in January, 1913, Mr. Stevenson saw what he describes as "a small owl with a long tail" in the timber of a mountain top. On June 16, 1895, Messrs. Bailey and Howell reported a female shot at Summit, when "feeding in a marshy tract, watching its prey from the tops of dead trees." In the winter of 1899–1900 Mr. Higginson reported one shot by Charles Olson on the ridge back of his cabin, where it was busily eating a Franklin grouse.

Rocky Mountain Pygmy Owl: *Glaucidium gnoma pinicola.*—A mounted specimen of the hornless pygmy owl, only 6 or 7 inches long, in the collection of Mr. Liebig, came from Lake McDonald, and Mr. Bryant thinks it nests in the park, where it should be looked for mainly in the pines and on dead trees. Although diurnal, this tiny owl is more commonly seen at dusk or in the early morning in September or October around the border of the prairie patches on the west side of the Park. Mr. Bryant writes: "On a fine sunny day the pygmy owl will often perch on the topmost twig of some tall larch, and morning and evening give a peculiar but pleasing sort of whistle." The white-headed lumberjacks "can mock them perfectly," he says, and he adds, "Many times when I thought I was about to collect a pygmy I have come face to face with the jack."

Order COCCYGES: Cuckoos, Kingfishers, etc.

Family ALCEDINIDÆ: Kingfishers.

Belted Kingfisher: *Streptoceryle alcyon alcyon.*—The bluish-gray kingfisher is quite common in the park, along creeks where there are fish. It was seen on Kennedy Creek, Belly River, the North Fork of the Flathead, and Lake McDonald, and one came flying up the sharp turns of the Swiftcurrent when we were camped below Many Glaciers, where the high banks of the creek offered good nesting sites. Just the right kind of soil is needed for the nest, which is above high-water mark, at the end of a laboriously excavated horizontal tunnel five or six feet long.

In the park where harlequin ducks and water ouzels are the familiars of the waterfalls and rapids along the mountain streams, the rattle of the kingfisher is heard with a start, associated as it usually is with placid pasture brooks and quiet lake shores.

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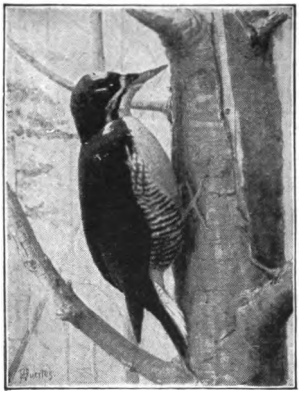
Order PICI: Woodpeckers, etc.

Family PICIDÆ: Woodpeckers.

ROCKY MOUNTAIN HAIRY WOODPECKER: *Dryobates villosus monticola.*—The Rocky Mountain form of the black and white hairy woodpecker with the red patch at the back of its crown, one of the most useful destroyers of wood borers, was reported by Mr. H. C. Bryant, of California, from Iceberg Lake, July 27, and McDonald Creek, July 31, 1917, and the following April Mr. Bailey noted it at intervals from Lake McDonald to the Kintla Lakes. In 1895 several were noted and one taken by Messrs. Bailey and Howell at St. Mary Lake.

BATCHELDER WOODPECKER: *Dryobates pubescens homorus.*—The small familiar note of this downy woodpecker may often be heard when the little black and white form is hidden in the shadows of the forest. It was seen at St. Mary chalet, Belly River, and Lake McDonald, and Mr. Stevenson records it from Swiftcurrent Creek.



From Biological Survey.

FIG. 61.—Arctic three-toed woodpecker.

ARCTIC THREE-TOED WOODPECKER: *Picoides arcticus.*—A woodpecker recognized by his yellow crown patch as a three-toed, and by his solid black back as an Arctic three-toed, was seen in the woods near Lake Josephine. In June, 1895, Messrs. Bailey and Howell reported the birds as quite common on the west slope, mostly in the burnt timber, and in the winter of 1899–1900 Mr. Higginson found them "in great abundance" around Stanton Lake, near the western border of the park, "on the ridges and in the river bottoms." In April, 1918, Mr. Bailey saw them in many of the old burns in the valley of the North Fork of the Flathead, heaps of bark scales often marking the base of some dead tamarack where they had been feeding.

As the great bulk of the food of the three-toed woodpeckers consists of the larvæ of wood borers, they rank among the most important conservators of the coniferous forests.

ALASKA THREE-TOED WOODPECKER: *Picoides americanus fasciatus.*—By the trail near Baring Falls, at Going-to-the-Sun Camp, hearing a soft tapping on the side of a spruce stub I discovered a woodpecker with the yellow patch above his bill that names him a three-toed, and a white stripe down his back, barred with black, which gives him the name of "ladder-back."

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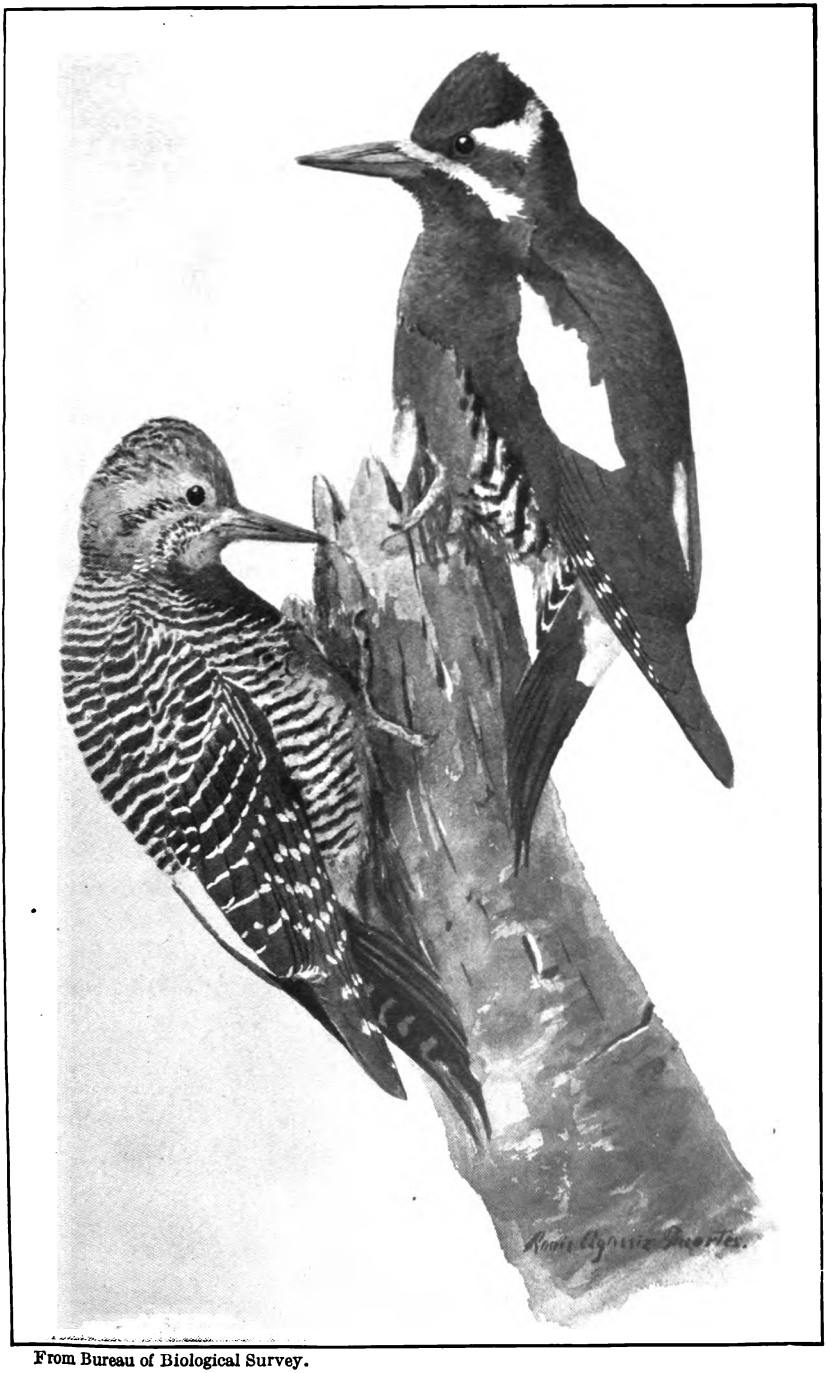

From Bureau of Biological Survey.

WILLIAMSON SAPSUCKERS.

Left figure, female; right figure, male.

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With quick, masterful blows, now from the left, now from the right, sometimes steadying himself with a strong foot, he would send the bark scales flying. But when the hole of the borer was uncovered, after digging straight down, he would carefully pull out the delectable larva. He paid little heed to me, and when a guide with goatskin chaparrajoes rode rapidly by down the trail he merely sidled around to the back of the tree trunk.

A number of other Alaska three-toes were seen during the summer, notably on the Swiftcurrent, near Many Glaciers, at Glenn Lake, on the Kootenai Trail, and at Lake McDonald. On the Swiftcurrent Pass Trail one flew from an old burn, and another, crossing the trail ahead of us, became so absorbed in picking on an old log that he let us ride up within a few feet of him. On the Piegan Pass Trail near Many Glaciers in a windfall where uprooted trees and twisted-off trunks made a confused tangle, letting in the light, between the trees cobweb bridges caught the sun, and the sunlit spaces below were filled with beds of fresh green ferns, hellebore, and bright yellow arnicas. Here a family of young three-toes were living, in early July. Short-billed and short-tailed, the little fellows called in monotonous iteration, as if to keep their parents informed of their whereabouts, and at intervals announced with sudden emphasis the arrival of a meal. At Lake McDonald, the last of August, an old Picoides was seen with its young one on an old tamarack, the young one still calling in infantile tones.

From Biological Survey.

FIG. 62. — Northern pileated woodpecker.

RED-NAPED SAPSUCKER: *Sphyrapicus varius nuchalis*.—The red-naped sapsucker—whose red crown and nuchal patch are separated by a black area and whose chest is black between the red throat and pale lemon-yellow belly—is said by Mr. Bryant to nest in lodgepole pines. The work of sapsuckers—bands of small holes girdling the trees—was seen in a number of places.

WILLIAMSON SAPSUCKER: *Sphyrapicus thyroideus nataliæ*.—Like other sapsuckers, the Williamson, which is notable for the strikingly different plumage of the sexes—the female brown barred and the male black, red, white, and yellow—is found in the lower levels of the park. It was reported by Mr. H. C. Bryant, of California, from Lake Ellen Wilson, July 21; Reynolds Creek, July 23; and McDonald Creek, July 31.

NORTHERN PILEATED WOODPECKER: *Phlœotomus pileatus picinus*.—Largest and most notable of all the woodpeckers of the North, the

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great pileated, with its black body and red-crested head, should be looked for diligently. While it is a rare, shy bird, its presence may be guessed by its hammering, its loud *chuck-chuck-chuck-chuck-chuck-chuck-chuck*, and by its borings—excavations, often two feet long, made in the soft, decayed wood of old trees. Borings were seen

Photograph by Robert B. Rockwell.

FIG. 63.—A family of red-shafted flickers.

in various places in the park, and near Sun Camp Mr. Bailey saw one of the great birds at work. Mr. Stevenson reports the pileated from the North Fork of the Flathead, and Mr. Bryant says it nests in the tamaracks on the west side.

RED-HEADED WOODPECKER: *Melanerpes erythrocephalus*.—The red-headed should be carefully distinguished from other woodpeckers

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having red patches on the head. In the red-head the entire head and neck down to the white breast and the black back is crimson, and the rump and a wide patch near the ends of the wings are solid white. Mr. Gibb thinks he has seen it on Belly River and Kennedy Creek, and a few around St. Mary Lake and Lake McDermott, and reports it from Belton, in winter. Mr. Stevenson also records it from the west side of the park.

LEWIS WOODPECKER: *Asyndesmus lewisi.*—Mr. Stevenson writes that he has seen the Lewis woodpecker—with iridescent greenish black upperparts, gray collar, crimson face, and rose-pink belly—on the North Fork of the Flathead; and Mr. Liebig writes that he once secured three specimens at the head of Lake McDonald and one near Belton.

RED-SHAFTED FLICKER: *Colaptes cafer collaris.*—Flickers were frequently seen in early August on the level floor of the horse pasture below Many Glaciers; as usual, looking for ants on the ground. When they rose they showed the rich salmon wing linings which have given them their name. The golden-shafted flicker is recorded by Mr. Bryant from the Flathead Valley, and in 1895 Messrs. Bailey and Howell secured a specimen at the Upper St. Mary Lake which was a typical red-shafted except for its head and neck, which were like those of the golden-shafted.

The red-shafted were seen in a number of places, mainly in the lower parts of the park, such as St. Mary Lake, the Swiftcurrent Flats, Belly River, Lake McDonald, and the open areas along the North Fork from Dutch Creek to Kintla Creek, especially at the Adair ranch and on the Big Prairie section, but they were also seen in the Kootenai Pass, August 22, and heard by Mr. Bryant at Iceberg Lake July 28, 1917. Mr. Stevenson reports finding a number of nests in the park.

Order MACROCHIRES: Nighthawks, Swifts, and Hummingbirds.

Family CHORDEILIDÆ: Nighthawks.

PACIFIC NIGHTHAWK: *Chordeiles minor hesperis.*—Nighthawks have been noted in the park by Mr. Gibb and Mr. Stevenson, and also by Mr. Bryant, who has found them in the prairie patches along the North Fork of the Flathead.

Early in July, from the western windows of Glacier Park Hotel at sunset, one of the slender-winged birds was seen tilting about in the purple middle distance between the hotel and the mountains, getting his evening meal. A month later, while watching the fish

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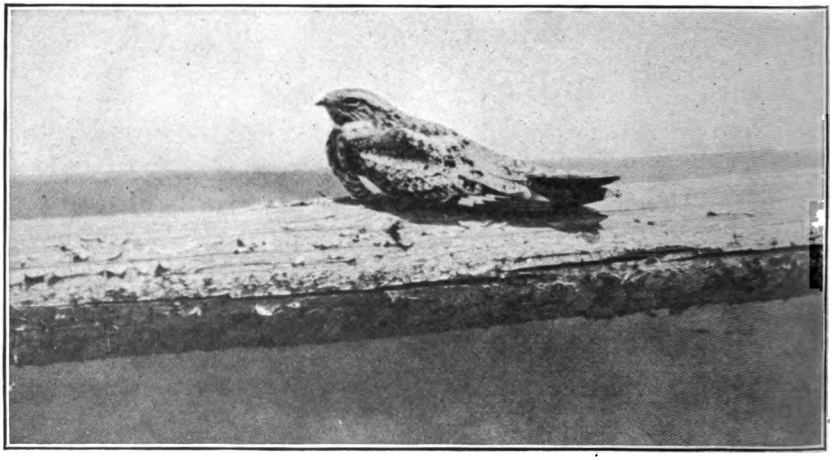
hawk's nest on the Swiftcurrent at sunset, the sound of *peent*, *peeauk*, delighted my ear—here was a nighthawk inside the park at last! Still better, there were two, tilting and pitching about, showing their white wing bands. Creatures of air and sky, it seemed rarely fitting that they should be here to explore the purple heights and golden summits. On they went up toward the glacial basins of Grinnell and Swiftcurrent, dark and somber now, but with buffy clouds above their peaks, and lines of gilding and touches of light vivifying the picture.

The only other nighthawks seen by us in the park were flying about near the International Boundary—a wide green swath down the forested side of the mountains—the unfortified, unguarded line where brother meets brother under the open sky.



Photograph by E. R. Warren.

FIG. 64.—Nighthawk.

Family MICROPODIDÆ: Swifts.

VAUX SWIFT: *Chætura vauxi.*—Three swifts, with their bony outline and irregular, batlike flight, were seen July 8 near Many Glaciers, twittering softly as they flew high through the sky.

WHITE-THROATED SWIFT: *Aëronautes melanoleucus.*—Mr. Gird thinks he has seen a swift with white underneath on the North Fork of the Flathead and about Hanshaws Ford, three miles from the foot of Bowman Lake; and in June, 1895, Messrs. Bailey and Howell reported "one seen at Paola and a pair at Columbia Falls."

Family TROCHILIDÆ: Hummingbirds.

BLACK-CHINNED HUMMINGBIRD: *Archilochus alexandri.*—Both Mr. Bryant and Mr. Stanford record the Hummingbird "with the black gorget." Mr. Bryant says that years ago he shot several of them.

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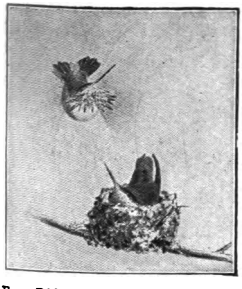
BROAD-TAILED HUMMINGBIRD: *Selasphorus platycercus.*—Two broad-tailed hummingbirds were collected by Messrs. Bailey and Howell in 1895, a female taken May 23 in the spruce woods near the Upper St. Mary Lake, and a male with rose-pink gorget and bronzy green head taken June 17 at Summit.

RUFOUS HUMMINGBIRD: *Selasphorus rufus.*—The reddish-brown hummingbird whose gorget flashes fire red, orange, and brassy green was seen July 8 on a telephone wire near the tepees at Many Glaciers, and Mr. Gibb said one had come to the piazza at his ranger station. One was also seen about the lake on June 29, 1913, by Mr. E. R. Warren. At Granite Park Mr. Bailey saw one on July 17, and on the pass between Gable and Chief Mountains on August 9, I caught a flash of rufous as one came up from below and whizzed on across the pass. In June, 1895, Messrs. Bailey and Howell reported quite a number seen and one shot at about 5,000 feet on the mountain near Nyack.

From Handbook of Western Birds (Fuertes).

FIG. 65.—Rufous hummingbird.

Hummingbirds are said to be found close to the glaciers, and the mountain flower beds should be watched for them. Spirited little knights of Tournay, with flashing armor and lances at rest, they may well afford rare entertainment for spectators.



From Ridgway. Smithsonian Inst.

FIG. 66.—Calliope hummingbird.

CALLIOPE HUMMINGBIRD: *Stellula calliope.*—This little hummingbird, one of the smallest found in the United States, with pink gorget and sides tinged with brown and green, should be looked for, as it is a mountain-loving species frequenting mountain parks and rocky hillsides from 6,500 to 8,000 feet during the nesting season. At Fort Sherman, Idaho, its arrival is said to be coincident with the blooming of the wild hawthorne.

At Granite Park on July 17 a hummingbird, with the soft flight of calliope, darted into a white-barked pine in front of the chalet; but, unfortunately, before it could be examined, darted out again and was gone.

There is one definite record for the park, however, as a female was collected May 31, 1895, by Messrs. Bailey and Howell at the Upper St. Mary Lake. Mr. Stanford has also heard of the bird, though he has never seen it himself.

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Order PASSERES: Perching Birds.

Family TYRANNIDÆ: Tyrant Flycatchers.

KINGBIRD: *Tyrannus tyrannus tyrannus.*—The familiar kingbird with the white underparts and white tail band is recorded by Mr. Bryant from the park along the North Fork of the Flathead. He says it breeds but is not common anywhere in the park or in the northern part of Flathead County.

From Biological Survey.
FIG. 67.—Kingbird.

OLIVE-SIDED FLYCATCHER: *Nuttallornis borealis.*—One of the characteristic notes of the forested mountains is the plaintive *pew-pip, pew-pew-pe'-oh, pew-pip, pew-pew-pe'-oh.* It was heard in a number of places in the park, and one of the birds was seen August 19, at the Reynolds Cabin Lakes, near Waterton Lake, sitting characteristically on top of an evergreen spire, its white median line showing between the dark gray of its sides as it raised its head to give its sweet call. On the southwestern boundary of the park, from Java to Belton, in June, 1895, Messrs. Bailey and Howell found it in the dead timber ranging to timberline.

WESTERN WOOD PEWEE: *Myiochanes richardsoni richardsoni.*—In June, 1895, at the upper St. Mary Lake, Messrs. Bailey and Howell collected one pewee and saw one or two more; and from Summit westward along the boundary line of the park a few others were seen.

The pewee is a bird that is easily overlooked, as its gray plumage renders it inconspicuous and its quiet call—given as *tweer* or *deer*—can be heard only near at hand. Like the eastern wood pewee, it sits erect watching for passing insects, when one appears, darting out, snapping it up and circling back again to its perch.

WESTERN FLYCATCHER: *Empidonax difficilis difficilis.*—A small flycatcher taken for the western was heard, July 10, above Lake Josephine and two having the characteristic dull yellow underparts were seen July 30 near Gunsight Lake, and August 28 on the Camas Lake Trail above Lake McDonald.

TRAILL FLYCATCHER: *Empidonax trailli trailli.*[1]—A small gray flycatcher with white chin, gray breast, and white wing bars, was seen in several places in the park among the willows, where its *pip, pip,* and its explosive *ka-wee'-ur* were heard as it circled out from its perch to snap up passing insects.

[1] Formerly the Alder Flycatcher, *Empidonax trailli alnorum.*

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From Handbook of Birds of the Western United States.

BLACK-BILLED MAGPIES.

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HAMMOND FLYCATCHER: *Empidonax hammondi*(?).—Mr. H. C. Bryant, of California, saw an *Empidonax* July 31, 1917, that he took to be *hammondi* in "some open woods near Lewis's on Lake McDonald."

Family ALAUDIDÆ: Larks.

DESERT HORNED LARK: *Otocoris alpestris leucolæma.*—Mr. Bryant has seen horned larks at Belton on the railroad track in fall, but never in the park. Mr. Stevenson, however, has seen them on the high barren ridges of the park, and says they are common outside on the dry plains to the east. On April 15, 1918, Mr. Bailey saw two on the Big Prairie of the North Fork, where there were open fields suitable for breeding grounds.

FIG. 68.—Horned lark.

Family CORVIDÆ: Crows, Jays, Magpies.

MAGPIE: *Pica pica hudsonia.*—The magpie, with its striking black and white plumage, long graduated tail, and loud, strenuous voice, is one of the spectacular birds of the region, but the only ones seen by us were outside the boundary of the park, near the upper St. Mary Lake, although they are said to come up into the park for exposed garbage. The bulk of them, Mr. Bryant says, enter the park in September and leave the last of March. In fall and winter he has seen them on the prairie patches along the North Fork of the Flathead.

BLACK-HEADED JAY: *Cyanocitta stelleri annectens.*—The high-crested, black-headed blue jay is one of the handsomest, most dominant birds of the pine forests, dashing around and flying from tree to tree, calling loudly as he goes. For this reason the apparent decrease in his numbers in the park is striking. In 1887 Dr. Grinnell said that in the St. Mary Lakes region the jays were common in the pine forest up to the rocks; and in 1895 Messrs. Bailey and Howell observed them at timberline and in the spruce timber on the side of Kootenai Mountain, and reported them common from Java to Belton. In the winter of 1899–1900 Mr. Higginson reported them very abundant in the Stanton Lake region, staying most of the time on the high ridges. But during the two months that we spent in traversing the park we saw them in only four localities—at a lumber camp at the head of Lake Josephine, near Waterton Lake, at the Reynolds Cabin, and on the Camas Lake Trail above Lake McDonald; and on Mr. Bailey's return to the west side of the park in April, he saw only one—at Belton. Perhaps, like the eagles, they have been accidentally caught by the fur trappers.

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In winter, Mr. Gibb told us, the handsome birds have come to his ranger cabin for food, getting so tame that if the door were left open they would come inside.

Rocky Mountain Jay: *Perisoreus canadensis capitalis.*—The big fluffy camp bird, or lumber jack, when met with in the park was sometimes on guard, slipping through the tree tops and sailing down across an open space with short wings and long tail outspread in absolute silence, but when off guard it flew about giving vent to its feelings in a most surprising variety of loud, strange calls. The hunter who names the jay "moose bird" complains that "he bothers

Photograph by E. R. Warren.

Fig. 69.—Rocky Mountain jay.

a fellow stalking game—gets up in a tree and bawls you out—everything in the country knows you are around." Where game has been killed, as Mr. Higginson says, the jays seem to gather like buzzards to feed off the meat, becoming so tame they will allow a close approach. They have been found storing food by Dr. Grinnell, putting it in moss near the ends of branches of tall firs and spruces.

In winter Mr. Gibb has had these familiar friends of the forest come to his ranger cabin, where they became so tame and persistent that it was hard to keep the coveted meat from them. They got so expert that they could pry off the lid of a granite bucket and, chattering while they worked, actually untied the knot in a string with which Mrs. Gibb had fastened on the lid.

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RAVEN: *Corvus corax sinuatus.*—The ravens, while not becoming tame like the camp jays, are said to come around the reclamation camps for food. At Stanton Lake Mr. Higginson found them very common winter visitors "round the deer offal in the river bottoms and also quite a frequent visitor at the lake." He says, "We used to hear their mournful croak as they sailed over us at all times, but they seemed to be particularly attached to the river bottoms, and it was there that I saw most of them. They were wary and shy to a degree."

Like the jays they are on the lookout for game. As an old hunter said, "Go out in a canyon and kill a deer, and these buggers will come," and he added that "they will circle around when meat is being dressed." The Blackfeet, he told us, "instead of hanging up their meat as other hunters do, hide it on the ground, and to protect it from the ravens and coyotes take a stick that will peel off white and sharpen the end of it, and after dressing the deer stripe the stick with blood like a barber's pole, and lay it alongside the meat. This they have done for generations and generations."

The ravens are common on the west slope of the mountains, Mr. Stevenson says, and seen occasionally on the east slope. The only two seen by us during the summer were flying from the park across Belton. Three were seen by Mr. Bryant, of California, flying over Lincoln Pass. "While they were in sight," he says, "several marmots in the vicinity seemed greatly disturbed, each standing erect and giving his loud piercing whistle." In April, 1918, Mr. Bailey saw and heard them from Lake McDonald up the North Fork valley to the Kintla Lakes, especially where coyotes had been killing deer.

WESTERN CROW: *Corvus brachyrhynchos hesperis.*—A pair of crows were seen at their nest July 5 at Glacier Park, and a flock seen July 7 between Glacier Park and St. Mary Lake. They were also seen on the Sherburne Lake Flats and north of the Alberta boundary. They are said by Mr. Gibb to stay in the park from early spring until late fall.

CLARK NUTCRACKER: *Nucifraga columbiana.*—At Many Glaciers, when the automobile stages are drawn up before the door, one of the strongly marked Clark crows, or nutcrackers, may be caught sight of, glancing back warily as he flies away over the tree tops; or in one of the lower valleys, such as the Swiftcurrent, he may be seen crossing with strong direct flight from ridge to ridge of the landscape; but at such places as Granite Park or Iceberg Lake, as on rocky slopes among the timberline dwarfs, he is found at home, his loud *kar'r'r'r* sounding through the clear mountain air as he goes about hunting for cone seeds in the pine tops. Flying in straight as a ruler he will often curve up to the spire and light with a steadying flash of his black and white tail.

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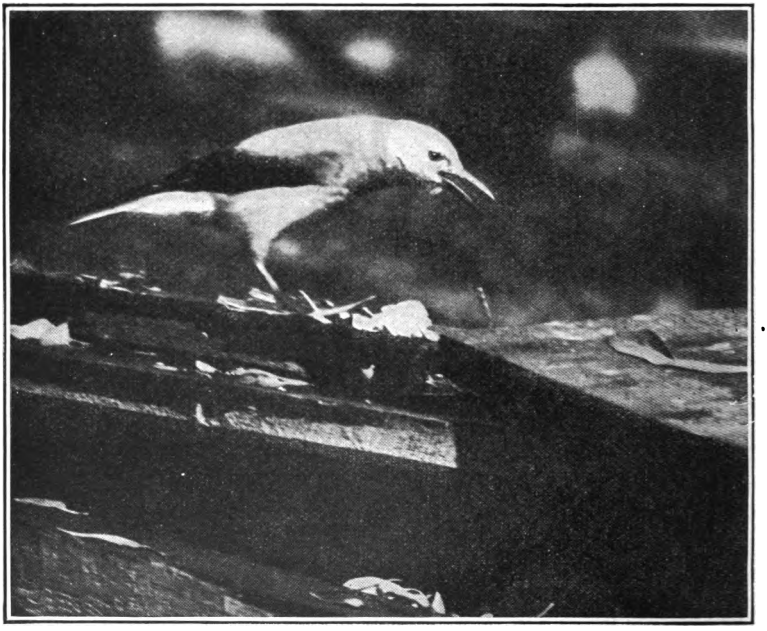
At Iceberg Lake, while a party of us were lunching among the dwarf balsams, a family of the nutcrackers came into the trees on the edge of our circle. When we were discovered the weak-voiced though grown young were apparently taken off by themselves, after which the old ones returned with the air of being accustomed to sharing meals with their visitors. One of them, encouraged by his reception, flew down and picked up half a slice of bread, returning to his tree with it. As he started to lay it down on a branch, one of the ladies cried out in consternation, "He's going to drop it!"

"Not much, he wouldn't drop it for a farm," one of the men assured her, following with a dissertation on the thrifty bird's



Photograph by E. R. Warren.

FIG. 70.—A Clark nutcracker in too much of a hurry.

storing habits. All eyes were fixed on the big black and white form of the visitor, and when at last he carefully laid the slice of bread on the green shelf the troubled lady cried out with relief, "Now he's got it stored!"

A few moments later—our attention having been diverted—we looked back just in time to see a nutcracker come in, pick up the bread, and fly off with it.

"She swiped his bread!" one of the men exclaimed. But was it the suspected spouse, or had her lord, thinking of a safer place for his treasure, slipped back quietly to remove it? Let us give the lady the benefit of the doubt. Among other dainty morsels accepted by

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one or the other of our guests at the lunch hour was part of a tongue sandwich.

The nutcrackers' more natural feeding habits are described by Mr. Higginson from Stanton Lake, where he spent the winter. "They were common," he wrote, "on the high ridges and seen frequently at our camp, but never lower down. They were for the most part in flocks of from six to a dozen, sometimes in pairs, but never apparently single. Often during a cold afternoon one would hear their harsh cry and going out of the cabin find a little bunch at work on one of the large fir trees which were near by. Unlike the jays, they usually began at the top of the trees and worked down to the bottom. If disturbed, they would fly off to the nearest dead tree and, sitting on its topmost limbs, utter their opinion of us in very powerful language."

Family ICTERIDÆ: Blackbirds, etc.

SAGEBRUSH COWBIRD: *Molothrus ater artemisiæ*.—In the horse pasture of Many Glaciers 13 cowbirds were seen July 11 walking about among a group of horses, rising and following as they started away. In the wooded creek bottom near by, a striped female in the top of a dead spruce called loudly until her brown-headed, glossy black mate joined her; when they sat looking around while a yellow warbler and a Maryland yellow-throat sang. Were the sorry pair, in search of orphanages, taking notes? Here were two small birds in whose nests an extra egg or two might safely be left. Were they waiting for the songsters to go to their nests or merely locating the families before making a detailed inspection of likely bushes?

From Biological Survey.

FIG. 71.—Red-winged blackbird.

The rope corral at camp where our horses were fed attracted the cowbirds, and when we broke camp one of them followed our pack outfit for more than a mile. At a subsequent camp on Belly River two other cowbirds made themselves at home in the corral, nonchalantly perching on the backs of the horses. By going about among such a bunch of horses with which there were cowbirds, Mr. Stevenson once succeeded in taming two of the birds so that they would take flies and mosquitoes from his hand.

THICK-BILLED REDWING: *Agelæius phœniceus fortis*.—Near the Sherburne Lake flood land I heard what I took to be the *o-ka-lee* of a redwing on August 4, but none of the birds were seen. Mr.

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Stevenson says it is "rare, but noted," and Mr. Gird records it from the swamps of the North Fork of the Flathead, and also the Belly River country.

From Handbook of Birds of the Western United States.

FIG. 72.—Meadowlark.

WESTERN MEADOWLARK: *Sturnella neglecta neglecta.*—The meadowlark, with his handsome black-collared yellow breast and his protectively colored brown-streaked back, is rare in the park, though seen between Many Glaciers and the St. Mary Lakes and reported from the Sherburne Lake Flats, Belly River, and the North Fork of the Flathead. One was seen years ago by Mr. Bryant at Ernest Christianson's ranch on Camas Creek at Thanksgiving, and Mr. Christianson has told him of one wintering in his hay sheds. On April 18, 1918, Mr. Bailey heard meadowlarks singing in the fields at the Adair ranch, south of Logging Creek, but apparently they had not yet reached the Big Prairie country.

Photographed by E. R. Warren.

FIG. 73.—Brewer blackbird.

BREWER BLACKBIRD: *Euphagus cyanocephalus.*—The only blackbirds seen by us were just outside the boundaries of the park in one of the valleys a few miles north of Glacier Park Hotel and on the Belly River north of the International Boundary, but both were so near the line that the birds would very likely have come into the park. Mr. Bryant reports them from the prairie

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patches along the North Fork of the Flathead, and Mr. E. R. Warren on June 20, 1913, saw them at St. Mary Lake.

Family FRINGILLIDÆ: Finches, Sparrows, etc.

WESTERN EVENING GROSBEAK: *Hesperiphona vespertina brooksi.*—The yellowish green underparts, bright yellow forehead, and olive back of the grosbeak, set off by his black markings, identify him unmistakably even when his large yellowish green seed-cracking beak can not be seen, and he should be watched for in the park, as he is said to breed in the region. On July 2 and 4, 1913, Mr. Warren saw four at Belton, and on July 17, 1917, Mr. H. C. Bryant, of California, saw a pair around the Belton chalets. The birds were also said to have come to the cottages at Lewis's for food, much to the enjoyment of the visitors. Mr. E. S. Bryant thinks they are most plentiful in the spring migration, but says they breed some years fairly commonly and are seen throughout the year. He has seen them feeding young at Columbia Falls, and Mr. Stanford says they bred at Kalispell in the summer of 1917. Mr. Stanford adds that both grosbeaks and Bohemian waxwings generally feed around town all winter. Mr. Bryant has seen them in late winter in such places as alder bottoms. At Stanton Lake, in the winter of 1899–1900, Mr. Higginson saw only one small flock. On April 11, 1918, Mr. Bailey saw one at the lower end of Lake McDonald.

From Biological Survey. (Fuertes.)

FIG. 74.—Evening grosbeak.

ROCKY MOUNTAIN PINE GROSBEAK: *Pinicola enucleator montana.*—A bird taken for the pine grosbeak, which is larger than the evening grosbeak and carmine red in full adult plumage, was heard singing high on a dead tree on the Camas Lake Trail on August 28, 1917. Mr. Gibb says he has seen it in the park in summer, and Mr. Bryant thinks it nests there. Mr. Stevenson reports it as rather a common bird of the winter months, and Mr. Bryant has found it along the alders in the bottoms after heavy snowstorms, although in clear, cold weather as late as February he has found it at 7,000-foot levels. Mr. Gibb has had the birds come to his ranger cabin for food in winter, and as they were tame and unsuspicious they made delightful winter pets. Mr. B. N. Gephart reports that they are abundant all winter about his place on the Camas Creek Ridge, as many as fifty often being seen on his doorstep.

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From his Stanton Lake camp Mr. Higginson wrote: "I had been on the lookout for these birds all winter, but without seeing any until January 29. On that day I walked out of my cabin to find the small pine trees occupied by about 20. From this time on they were very plentiful, and I took a number of specimens varying in plumage from the young gray birds to the old dark red males. Some flocks I found low down in small trees, but for the most part they were in the tall fir trees that bordered the edge of the lake." In the fall of 1887 Dr. Grinnell found the pine grosbeaks quite abundant in the mountains about Red Eagle and Cut Bank, "many singing sweetly, even during snowstorms." On April 10, 1918, Mr. Bailey heard them singing at Belton, and one was seen and heard, April 19, near Dutch Creek.

From Handbook of Western Birds.

FIG. 75.—Cassin purple finch.

CASSIN PURPLE FINCH: *Carpodacus cassini.*—A pair of the Cassin finches, the male dull pinkish with a square crimson crown patch, and the female brown and streaked, were found at Granite Park in the middle of July singing around the chalet and picking up grain spilled by the saddle horses. Doubtless the same pair were seen there by Mr. H. C. Bryant, of California, the last of July.

CROSSBILL: *Loxia curvirostra bendirei.*—A large parti-colored flock—some red, some yellowish, and some striped—were seen July

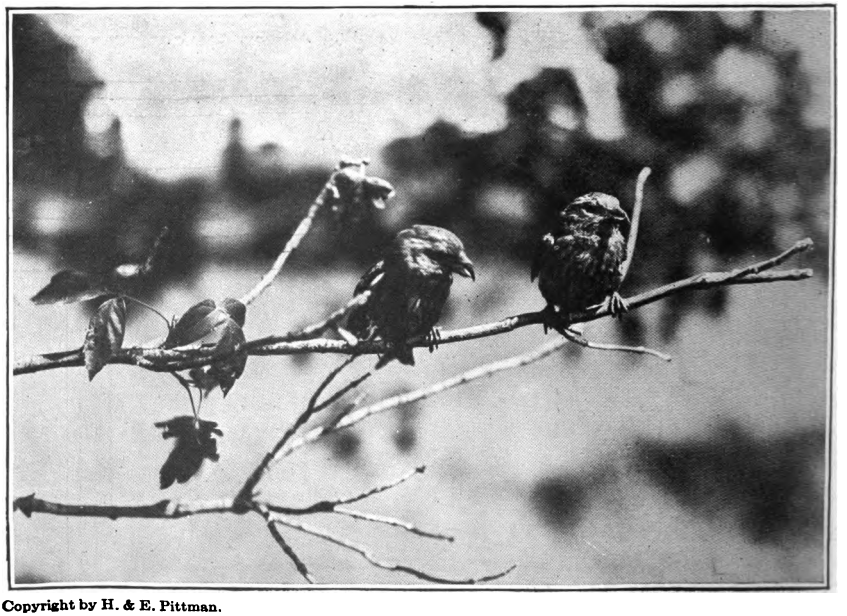

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FIG. 76.—Crossbills.

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18 in the wooded basin below the chalet at Granite Park going around from tree top to tree top in search of the cones whose seeds their sharply pointed crossed bills enable them to extract with dexterity. The metallic *kimp kimp* of the crossbills was heard in a number of places—Many Glaciers, Going-to-the-Sun Camp, Blackfeet Glacier Amphitheater, Waterton Lake, Reynolds Cabin Lakes, Kootenai Pass, and Lake McDonald. On April 21, 1918, Mr. Bailey heard crossbills about Lewis's Hotel.

In 1900, Mr. Bryant says, there were more crossbills than he has ever seen, but their numbers decreased steadily for several years afterwards. On May 30, 1895, Messrs. Bailey and Howell reported a flock of fourteen flying over the woods near Red Eagle Lake.

WHITE-WINGED CROSSBILL: *Loxia leucoptera.*—Mr. Bryant has found the white-wing feeding young, and says it undoubtedly breeds at times in the park. From 1900–1902, he says, the birds were in the park in great numbers along with the common crossbill.

GRAY-CROWNED LEUCOSTICTE: *Leucosticte tephrocotis tephrocotis.*—The summer home of the rare leucosticte or rosy finch is above ptarmigan slopes, among bare rocks such as the Garden Wall, and the rock piles of passes and summits where conies and marmots live; for in niches protected from the wind these hardy birds find shelter for themselves and their young. Outside few people ever see the delightful birds, for the search for them records long, hard climbs to lofty mountain peaks; but in the park, the trails over the passes leading by the ptarmigan slopes take one almost to the homes of the rosy finches, and by listening for loud, raucous calls and watching for wind-blown figures around the peaks, one may occasionally be able to locate them.

From Handbook of Western Birds. (Fuertes.)

FIG. 77. — Gray-crowned leucosticte.

At Gunsight Pass, attracted by their calls, we found them flying around the pinnacles above the trail, where there was a rare view down the grim canyon and over the smooth, green waters of Lake Ellen Wilson to the hazy ridges beyond the park.

In Piegan Pass a pair of the birds were found on the south slope feeding young and flying back and forth from the first dwarf spruces below the pass to the broken rocks of the diorite ridge on the crest above the pass, where perhaps some of the brood still lingered near the nest. A couple of days later a brood was seen on the warm south slope along the trail, where pipits were also feeding young and an old ptarmigan was leading around a brood. Busily hunting for tiny seeds and small insects, the rosy finches raised their caps so

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often that the gray border made a good field character, and now and then a deeply notched tail or a bright pink wing patch showed clearly. Back and forth across the trail they flew, now hunting over the grassy flower-strewn ground, now examining the dwarf firs, and now hunting over the great snowbank on the side of Piegan Mountain.

On Kootenai Pass leucosticte were also found, but of all the rare summits on which these birds of the peaks were seen perhaps the best was in the Boundary Mountains. A family of five were flushed here from a ridge whose summit was crowned by a monument marking the International Boundary, and near which a green swath through the forest divided British Columbia and Alberta. Here, where the mountains of the park reach their culminating grandeur, lofty peaks and ranges are gathered in such close conclave as to suggest a council of chiefs from north, south, east, and west. The broad seamed face of Agassiz glacier, the rough cascaded front of Kintla Glacier, with Kintla Peak towering 4,000 feet above its lake; snow patches, glaciers, looming peaks, ridge close behind ridge, and below, a mantle of dark timber—such was the chosen home of Leucosticte.

Hardy mountaineers, in spring while the mountain tops are still buried under snow, they may be found in the low mountain valleys; but in late fall they have been found high up in the mountains, and seen in the valleys only in the worst snowstorms.

REDPOLL: *Acanthis linaria linaria.*—A specimen of this redpoll with crimson crown, black chin, and streaked body was given us by Mr. Bryant, who said that in the spring one would think the Flathead River the main avenue of travel north for the juncos and redpolls of all North America. Mr. Gibb has seen redpolls in the park in winter.

From Stanton Lake, in the winter of 1900, Mr. Higginson wrote: "Toward the beginning of February we began to hear these bright little songsters, sounding for all the world like a canary, singing away on the border of the lake. Just across from the cabin was a little thicket of alder bushes, and in this thicket the redpolls could almost always be found. They fed on the buds of this bush and there they would hang half the time head down stuffing themselves full, and only stopping every now and then to sing." As the lake is only about two miles from the park, the birds might easily stray across the border.

PINE SISKIN: *Spinus pinus pinus.*—One of the notes most frequently heard in the higher parts of the park is the wild split note of the little siskin, the brown-striped cousin of the goldfinch, which,

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in its undulating flight seems to fairly launch itself into the air, spreading its wings so wide that their yellow patches show. At Gunsight Lake, from a bear grass alcove between conifers, one day a siskin answered a brother passing overhead with an almost pure goldfinch—canary—note, over and over again; but at last, taking wing it launched out with the true wild call of its kind. Some that we watched through the glass seemed to be picking small insects from the needles of the firs, but when, in more usual custom, they hung head down from the catkins at the tip of the birch branches, they were doubtless extracting seeds.

At Lake McDonald the last of August, when a family lit on the broad top of a stub, small wings fluttered and young voices entreated—then all were off in air again. Around the hotel and up the lake shore, flocks were heard giving both their own wild notes and the sweet homelike notes of the goldfinches, and some of the little birds were seen coming down to the water's edge to drink. On Mr. Bailey's return to Lake McDonald in April the siskins were coming to the doorstep of Lewis's for crumbs, often flying into the house. They were numerous all through the valley of the North Fork of the Flathead and around the camps and ranches.

Snow Bunting: *Plectrophenax nivalis nivalis.*—The white and rusty snowflakes which breed in the circumpolar regions come down into the northern United States in winter in large flocks, their appearance being considered a "sure sign of snow," and Mr. Gibb says thousands of them come into the park.

Alaska Longspur: *Calcarius lapponicus alascensis.*—Breeding in Alaska, the longspurs winter as far south as Colorado and western Kansas. Large flocks have been noted by Mr. Stevenson in spring, and they have been seen in fall by Mr. Bryant on the prairie patches of the North Fork of the Flathead, and on the ridges with the leucostictes. Snowflakes and pipits are often seen in company with the longspurs, Mr. Bryant says. He has positively identified only this one species of longspur—with black foreparts and white belly—but suspects that a "close examination of the longspur flock would reveal some McCown and possibly chestnut-collared."

Chestnut-collared Longspur: *Calcarius ornatus.*—The Chestnut-collared, which breeds from Alberta to Kansas and can be distinguished from the Alaska longspur by its black underparts, which contrast sharply with its white and buffy throat, should be carefully watched for, as Dr. Grinnell thinks he has seen it on the Inlet Flat between the two St. Mary Lakes, and in June, 1895, Messrs. Bailey and Howell saw one not far from the park line, and found them common on the lower plains near Blackfoot.

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McCown Longspur: *Rhyncophanes mccowni.*—The summer McCown, distinguished from the Alaska and the chestnut-collared longspurs by its black-tipped tail, its rufous shoulder patch, and crescentic black chest patch, has been suspected by Mr. Bryant in longspur flocks in the park. Breeding on the Great Plains from Alberta to Colorado, it has been reported by Dr. Grinnell as very common close outside the park. While he writes that he should hesitate to say that he has seen it within the boundaries of the park, he says: "I have no doubt whatever that it would be taken by anyone who looked for it on the Inlet Flat, and probably also in the valley of the Swiftcurrent. I remember at times during the migration having seen flocks of these various prairie finches upon the Inlet Flat, and should offhand state with some positiveness that they were made up of McCown's bunting and the chestnut bunting."

Western Vesper Sparrow: *Poœcetes gramineus confinis.*—The pale, streaked vesper sparrow, marked by white outer tail feathers and made attractive by its rich, sweet song, was found on the prairies near the Upper St. Mary Lake, July 22, singing loudly from the low weeds. Others were seen between St. Mary and Many Glaciers, and Mr. Warren found them between Glacier Park Hotel and Bison Mountain in the small parks, in June, 1913. Mr. Bryant says they are also found in the prairie patches of the North Fork of the Flathead.

Western Savannah Sparrow: *Passerculus sandwichensis alaudinus.*—The small, heavily streaked Savannah sparrows with light stripe through crown and over eye were seen, July 7, between Glacier Park Hotel and St. Mary Lake; July 21, at the Upper St. Mary; August 5, on the Swiftcurrent Flats; August 13, along Belly River; and August 27, above Lake McDonald. They are also reported by Mr. Bryant from the prairie patches on the west side of the park, and Mr. Bailey found several of them on Big Prairie, April 18, where they seemed much at home on the fences and in the grassy fields.

From Biological Survey. (Fuertes).

Fig. 78.—White-crowned sparrow.

Western Lark Sparrow: *Chondestes grammacus strigatus.*—In speaking of the birds seen on the prairie patches of the North Fork of the Flathead, Mr. Bryant says, "I have never had the bird in hand, but I am sure I have seen the western lark sparrow." The chestnut patch and black and white streaks on the side of the head, together with the white tail corners, make it an easy bird to recognize.

White-crowned Sparrow: *Zonotrichia leucophrys.*—The handsomely marked white-crown is one of the most

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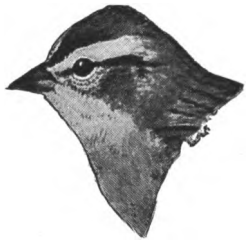
abundant and generally distributed birds of the park, its grave, sweet song being heard from the level of the prairie to timberline, and from the southern entrance of the park to the Canadian boundtry. Its four slow, clear notes are followed by grace notes that in some renderings seem rather out of keeping, but in the best renderings seem the necessary counterpart and completion of the first part of the song. According to the setting the song suggests various phrasings, as "*Clear mount'-ain brook, there-it-is;*" "*Oh see' the firs, see-see-see-see.*" At Sexton Glacier, where we were studying the glacier front with its irregularly flattened and compressed annual layers, the song rang in our ears till it seems to say, "*Oh see' the ice, say-see-see; Oh see' the ice, say-see-see;*" but where no especial phrase was suggested by the landscape, the words "*High up, high up, see-see,*" seemed to fit the cool, grave, uplifted song.

GAMBEL SPARROW: *Zonotrichia gambeli.*—On May 27, 1895, Messrs. Bailey and Howell collected a Gambel sparrow at St. Mary Lake. While resembling the white-crown very closely, it differs from it in having the space between the eye and the bill white instead of black.

WESTERN TREE SPARROW: *Spizella monticola ochracea.*—In 1887 Dr. Grinnell reported the western tree sparrow—which has a black spot on the unstreaked breast, and the crown and line back of the eye rufous—as quite abundant during the coldest part of October in the St. Mary Lakes region.

WESTERN CHIPPING SPARROW: *Spizella passerina arizonæ.*—Rufous-capped chipping sparrows were seen in many places, especially along the lower edges of the park, notably at Glacier Park Hotel, St. Mary Lake, Swiftcurrent Flats, Lake McDermott, Belly River, Crossley Lake, Gunsight Lake, and Lake McDonald. They are recorded from the prairie patches on the west side of the park by Mr. Bryant and were found by Mr. H. C. Bryant, of California, late in July at Iceberg Lake.



From Handbook of Western Birds.

FIG. 79.—Western chipping sparrow.

MONTANA JUNCO: *Junco oreganus montanus.*—Montana Juncos with slate-colored head, neck, and chest, white belly and brownish back, abound in the park, their '*tsip* being frequently heard and their disappearing white outer tail feathers often seen along the trails. A grown young one was seen July 8, at Lake McDermott, and two nests were found by Mr. and Mrs. M. I. Berger—one with three eggs, July 13, at Sun Camp, and another with six eggs, July 16, near Ice-

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berg Lake. Young just out of the nest were seen by Mr. H. C. Bryant, of California, July 22, near Lake Josephine. The birds were seen feeding grown young in many places. Mr. Stevenson speaks of seeing large flocks in spring and fall. While quiet birds that on your approach hide away in the bushes, the Juncos when sitting undisturbed in the sun have a pleasing little song, and their presence adds a grateful touch of life to the forest.

Mountain Song Sparrow: *Melospiza melodia fallax.*—Song sparrows were found in the bushes at the head of Sherburne Lake and on Belly River. One was found by Mr. Warren June 27, 1913, at Iceberg Lake, and others were recorded by Mr. Bryant from the North Fork of the Flathead, while a few were noted in 1895 by Messrs. Bailey and Howell at the St. Mary Lakes.

The possibility of finding the familiar song sparrow in the park adds to one's zest in searching among the bushes of the lake borders, for though he is here a bird of the mountains and his brown back may be a different shade from the one known at home, the spot on his streaked breast and the homely sweetness of his call and song are the same—a different subspecies he is, but a song sparrow is a song sparrow for a' that.

Lincoln Sparrow: *Melospiza lincolni lincolni.*—The Lincoln sparrow should be carefully watched for about the willows of the mountain meadows. While suggesting a small song sparrow, his buffy chest band, finely penciled breast, and individual song set him apart from his relatives. A bird that was taken for the Lincoln was heard by Mr. H. C. Bryant, of California, in one of the mountain meadows near the Sperry chalets.

In 1895 Messrs. Bailey and Howell reported these sparrows common in the brush patches and willow thickets at the upper St. Mary Lake. They were also found tolerably common near Blackfeet Agency, now Browning, and one or two were seen at Summit and Midvale, a nest with four eggs being found June 18, at Summit.

Slate-colored Fox Sparrow: *Passerella iliaca schistacea.*—Two dominant songs are heard in following the trails along the willow-bordered lake shores and through the open parts of the park, those of the white-crowned sparrow and the slate-colored fox sparrow. The black and white striped crown of the white-crown identifies him readily, but the dark gray head of the fox sparrow is less conspicuous, and unless you press close to the singer it is difficult to make out the characteristic fox-colored spots on his breast and his reddish tail. But once learned there is no mistaking his bright, cheery song, and as he stands silhouetted against the astonishingly green water of one of the beautiful mountain lakes the notes, with

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the catchy rhythm, phrase themselves—"*Green, green, wa'ter, see-it-there.*"

Like the song of the white-crown, the phrase may change with the setting, as under the white snow of Baring Basin one seemed to say, "*White, white snow' banks, see-them-there,*" and at Gunsight on a cold, cloudy morning, with fresh snow on the mountain sides another sang, "*Cold, cold wa'ter, see-it-there.*" A second song, clear, rich, and musical, something like the four-noted song of the white-crown, but reversed, began high and descended, suggesting "*Green lake, green lake, see-it-there.*"

In the grim amphitheater of Iceberg Lake, with its high glacier debouching into the green water, as we watched insectlike mountain goats climbing up the mountain walls above us and nutcrackers flying about over beds of heather, wind-bared, wide-skirted spruces, and snow banks tinted with the famous pink snow of circumpolar and Alpine regions, the "*High-up, high-up*" of the white-crown seemed well attuned to the spirit of the place. Then suddenly, to my astonishment there rang out loud and clear the bright, cheery "*Green, green wa'ter, see-it-there.*" What was he doing up here? As I asked myself the question I looked about and the willow thicket bordering the lake answered me. He was simply following the willows. Tracing the loud, sweet song to a hedge of spruce, on the tip of a spire I caught the familiar dark-gray head of my bird, and as he pitched down and I went to look for him, I found that he had been singing over a spruce alcove carpeted with the exquisite lemon-yellow Erythronium that was filling the air with its fragrance at the edges of melting snowbanks. But never did I appreciate the lovely song so much as when after protracted days of following trails through the dark coniferous forest we came out onto the sunny chaparral slope of Cathedral Peak and were greeted again by the bright, cheering voice of our friend.

ARCTIC TOWHEE: *Pipilo maculatus arcticus.*—The strikingly marked arctic towhee—the male with black foreparts, white belly, and brown flanks; the female with black replaced by olive brown—found scratching among the leaves on the ground or singing in a bush not far above, while characteristically a bird of the Transition and Upper Sonoran zones, breeds at these lower levels as far north as Alberta and Saskatchewan, and several were observed by Messrs. Bailey and Howell on May 24, 1895, at St. Mary Lake.

BLACK-HEADED GROSBEAK: *Zamelodia melanocephala melanocephala.*—Mr. Bryant reports the musical brown-breasted, black-headed grosbeak nesting in mountain maples inside the park in the region of the North Fork of the Flathead.

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LAZULI BUNTING: *Passerina amœna.*—A little male lazuli with bright-blue back and brownish breast was seen back of Glacier Park Hotel on a tree above a brushy bench, where it sang its bright, cheery song. Another lazuli was seen at Lake McDermott. The birds are also recorded from the North Fork of the Flathead by Mr. Bryant, and on July 1, 1913, Mr. Warren saw one along the railroad track about three-quarters of a mile west of Glacier Park Hotel. On October 18, 1887, Dr. Grinnell saw one in the brush of the St. Mary Lake shore.

Family TANGARIDÆ: Tanagers.

WESTERN TANAGER: *Piranga ludoviciana.*—At St. Mary Lake the latter part of July, as I followed a quiet wood road in the dark Douglas spruce forest with here and there a slanting streak of light from the late afternoon sun, I caught a song unheard for many years. Though failing to recognize it on the instant, I found myself trying to imitate it in the swinging rhythm of the tanager's song, and in a moment more caught a flash of yellow from the bird's breast, and at a turn got a glimpse of his red head between the closely spaced trees. But as I was exulting over the discovery, the beautiful bird disappeared as suddenly as he had come, among the dark shadows of the forest.

The only others seen by us were two found the last of August on the Camas Lake trail above Lake McDonald, but Mr. Bryant reports them from the North Fork of the Flathead, and in 1895 Messrs. Bailey and Howell saw one on the mountain near Nyack and heard a few along the line of the park between there and Belton.

Family HIRUNDINIDÆ: Swallows.

CLIFF SWALLOW: *Petrochelidon albifrons albifrons.*—Swallows taken for the cliff were seen August 2 flying over the flats of the St. Mary River and August 6 over the Swiftcurrent Flats. Mr. Gird thinks he has seen them on the North Fork of the Flathead.

From Handbook of Birds.

FIG. 80.—Cliff swallow.

BARN SWALLOW: *Hirundo rustica erythrogastris.*—Mr. Stevenson reports that the barn swallows with the long, forked tails have been seen, but are rare, and that they have been noted on the plains to the east of the park. On May 25, 1895, one or two were seen at the upper St. Mary Lake, and on June 20, 1913, Mr. Warren saw one or two along the road between Glacier Park Hotel and St. Mary.

TREE SWALLOW: *Iridoprocne bicolor.*—At the Upper St. Mary Lake, on July 21, in cottonwood stubs, we found three nests of the

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tree swallows with their snowy underparts and burnished steel-blue upperparts. The parents were still going to the nest holes, which were respectively about 8, 15, and 20 feet from the ground, but part of each family seemed to have flown and the air was alive with birds weaving about among the trees. Toward sunset we found a number of them on the telephone line that marks the boundary of the park. They and some mountain bluebirds had possession of the wires, but though there seemed to be abundant space, the swallows apparently wanted it all. Several times there was a heated chase, and once when a gentle bluebird was driven low it actually sat down on the ground and let the domineering swallow go by.

From Biological Survey.

FIG. 81.—Barn swallow.

At Mirror Pond near the Gunsight Trail tree swallows and probably cliff swallows were flying about over the quiet water with its yellowish green marshy border, disappearing up the river vista with its beautiful view of Gunsight Pass and its guarding peaks.

NORTHERN VIOLET-GREEN SWALLOW: *Tachycineta thalassina lepida.*—The swallows of the park need to be very carefully discriminated. The two with the brown breast are the barn swallow with the long forked tail, and the cliff swallow with the light forehead and pale rufous rump, while the two that are snow white underneath are the tree swallow, with the steel-blue upperparts, and the violet-green swallow, whose green crown and back contrast sharply with the violet of the rump patch. The cliff swallow makes a retort-shaped mud nest, often hung from a cliff or roofing slab of rock, while the barn swallow makes a cup-shaped mud nest often attached as a wall pocket to a rafter in a barn. The tree and violet-green swallows nest in holes in trees, and the violet also in cliffs. As it will nest in knot holes and bird houses, it is one of the birds that may be attracted by offers of hospitality. It would be worth while trying to attract it by bird houses at Lake McDonald, as it has recently been found on McDonald Creek.

From Handbook of Birds.

FIG. 82.—Tree swallow.

BANK SWALLOW: *Riparia riparia riparia* (?)—Like the tree and violet-green, the bank swallow is white underneath, but it has a dark band across the chest that distinguishes it, and it nests in colonies in banks such as railroad cuts or creek embankments. A nesting colony has been reported by Mr. Gibb from the Swiftcurrent, probably of

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bank swallows, although the unmarked, gray-breasted, rough-winged swallow also nests in colonies. Both the rough-winged and the bank are without the iridescent colors of the other swallows.

Family BOMBYCILLIDÆ: Waxwings.

BOHEMIAN WAXWING: *Bombycilla garrula pallidiceps.*—The fawn-colored, high-crested Bohemian waxwing, which breeds from Alaska to the northwestern border of the United States, should be looked for in the park. It may easily be told from the cedar waxwing, which breeds at the lower levels, by its larger size, brown forehead, and yellow and white wing markings, but it also has the waxy red wing appendages and the yellow tail band of the cedar waxwing. One of the distinguished looking birds was seen by us July 18 in the firs below the Granite Park chalet.

From Handbook of Western Birds. (Ernest Thompson Seton.)

FIG. 83.—Cedar waxwing.

During migration, in 1887, Dr. Grinnell found the Bohemians going about in close flocks of from 20 to 100, and extremely abundant about the St. Mary Lakes. He says: "Scarcely a day passed without one or more flocks being seen. They appeared to prefer the mountain side to the valley, though flocks were seen a number of times among the firs and spruces of the Inlet Flat."

CEDAR WAXWING: *Bombycilla cedrorum.*—In the bottoms of the Upper St. Mary Lake, where the tree swallows were nesting, the "beady note" of the waxwing was heard July 22, and one was discovered apparently feeding young. On the Swiftcurrent, August 6, grown

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young were seen with their parents in the willow thickets of the bottom eating black honeysuckle berries. In the Belly River country they were frequently seen, and they were also found in the Waterton Lake Valley and at Lake McDonald.

Family LANIIDÆ: Shrikes.

WHITE-RUMPED SHRIKE: *Lanius ludovicianus excubitorides.*—Several times in the fall of 1887 Dr. Grinnell saw the white-rumped shrike—with hooked bill, black eye stripe, slaty upperparts, and black and white wings and tail—on the Upper St. Mary Lake and in the valley of the St. Mary River.

Family VIREONIDÆ: Vireos.

WESTERN WARBLING VIREO: *Vireosylva gilva swainsoni.*—The low pleasing round of the little olive-drab vireo was frequently heard in the willow thickets along watercourses in the park—at Glacier Park Hotel, St. Mary Lake, Swiftcurrent Creek Flats, Gunsight Lake, Crossley Lake, Belly River, and Lake McDonald.

Family MNIOTILTIDÆ: Wood Warblers.

BLACK AND WHITE WARBLER: *Mniotilta varia.*—A black and white striped Mniotilta was seen, August 26, creeping over the trunks and branches at Lake McDonald, and Mr. Bryant is sure that he has seen the bird on the North Fork of the Flathead.

ORANGE-CROWNED WARBLER: *Vermivora celata orestera.*—A number of the dull olive-green orange-crowned warblers were seen, August 22, in a chaparral basin on the Kootenai Trail with a fall flock of migrants, and others were seen a week later in several places in the vicinity of McDonald Lake.

YELLOW WARBLER: *Dendroica æstiva æstiva.*—Yellow warblers, their underparts streaked with rufous, were found in willowy and brushy thickets at Glacier Park, the Swiftcurrent Flats, Upper St. Mary Lake, Belly River, and Lake McDonald. In 1895 Messrs. Bailey and Howell found a nest just completed on June 12.

From Biological Survey.

FIG. 84.—Audubon warbler.

AUDUBON WARBLER: *Dendroica auduboni auduboni.*—The handsome Audubon, which in flying from you flashes a bright yellow rump patch and when hunting for insects near by shows his yellow throat patch and black, yellow, and white under markings, is one of the most abundant and conspicuous warblers of the Glacier Park forests. In gathering insects for his young he goes about

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rapidly and capably, covering a great deal of ground from the dead tree tops down, jerking out his flat *quip'* with a preoccupied air, or, as he looks up and around, sometimes stopping to sing his loud warbler *chwee-chwee-chwee* or *swee-swee-swee, swee-ah, swee-ah, swee-ah, swee*, but keeping on with his work till his bill fairly bristles with insects, and the voices of young birds are heard from back among the dense spruces.

During the migrations, Mr. Bryant says, the Audubon warblers pass through the North Fork of the Flathead Valley "in immense numbers."

TOWNSEND WARBLER: *Dendroica townsendi.*—On the trail from Many Glaciers to Iceberg Lake the middle of July, high in the spruce and fir tops, both going and coming, I heard a faint warbler song with a drawled quality suggesting the eastern black-throated green, the nearest of kin to the Townsend. At Granite Park the same song was heard and a small warbler was seen flying out of a high tree top. Late in August, warblers taken for Townsends were seen on the Kootenai Trail, and at Lake McDonald about half a dozen were seen in the willows bordering a small pond, near enough to see their handsome yellow and black markings; while on the Camas Lake trail a number of others were seen in a fall flock of wandering migrants.

From Handbook of Western Birds. (Fuertes.)

FIG. 85.—Townsend warbler.

GRINNELL WATER-THRUSH: *Seiurus noveboracensis notabilis.*—When at Lake McDonald the last of August, we followed along the shore toward McDonald Creek till we came to a small pond formed by a trickling woodland brook, where two red-tailed Audubon thrushes stopped us. Along the marshy edge of the pond, in the soft brown earth, we discovered fresh tracks of deer and bear, which had gone down to the still pool to drink. As the woods were dark, the passing birds had gathered in the sunny willows on the opposite side of the pond, making such a busy throng that we sat down on a log under concealing branches to watch them. Bright yellow, black-capped warblers were whipping about; quiet, dull yellow, orange-crowned warblers were quietly hunting; and a sudden flash of salmon made us exclaim, "Redstart!" The drawl of a Swainson vireo called our attention to a small leaf-colored bird with neck outstretched hunting painstakingly for measure worms; little gay outbursts came from the warblers in the willows, and when

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the woods had been resounding with the *phee'-be-be* and *tsche'-de-de tsche'-de-de* of chickadees, a band of the cheery birds flew in, possessing the bushes. Then came a party of bright Townsend warblers with yellow cheeks, black eyelines, and green backs, keeping us busy watching them, now disappearing and then reappearing among the green leaves. Siskins and crossbills flew overhead calling, and occasionally the small voice of a Batchelder downy woodpecker or the remote *henk-henk-henk-henk* of a distant nuthatch were heard from inside the woods. Suddenly an exclamation came from Mr. Bailey, with glass focused on the willow border of the pond: "A Grinnell water-thrush!" We had been talking of the rare bird and hoping to see it, and here it was at last. Named for the ornithologist whose early exploration of the park had affixed his name to so many of the noble landscape features, this seemed indeed an appropriate place to find it, as I did now for the first time. Like its eastern relatives, the dark-backed bird, with streaked throat and breast and a dingy line over the eye, walked deliberately along the brown bank under the willows, teetering and dipping its tail according to the best water-thrush traditions; and then, perhaps, feeling itself too much the center of attention, disappeared in the dark thicket.

Happening to glance up along one side of the pond, I started, for there was a black bear coming leisurely along toward us! Entirely oblivious of our presence, he stopped beside a tall serviceberry bush on the edge of the pond and, raising up on his hind legs, pulled down the branches with his paws and proceeded to eat the delectable berries. Then, perhaps discovering us, he turned and, instead of coming on down the beach, waded, with low hind quarters, across the pond and disappeared in the thicket on the other side. As he went he flushed the water-thrush, which came hurriedly flying across the water, past us and off through the trees. What a rare secluded retreat we had happened on! Here at last we had seen the water-thrush and the warblers we had barely met in passing, and here at last we had found not only the usual woodland tracks but a maker of tracks, an actual denizen of the forest in one of his own quiet haunts. As we regretfully left the little pond in the woods, Mr. Bailey pointed out a beaver-cut tree and moose tracks—probably those of a moose that had been seen swimming the lake not long before. We had, indeed, chanced on a rarely favored drinking pool with its wildwood privacy!

Up the beach a short distance we came to McDonald Creek, and near its waterfall found the old nests of water ouzels, while over the rapids we watched the family of harlequin ducks riding; after which we cut across through beautiful hemlock forest back to the

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hotel trail. The woods were still—not a breath stirred the leaves, not a sound broke the silence, and patches of light lay unmoved on the tree trunks. Looking down we found we were following pointed tracks—a deer had been along the trail since we went up! A red-letter day, indeed, was that on which we discovered the Grinnell water-thrush!

MACGILLIVRAY WARBLER: *Oporornis tolmiei.*—The Macgillivray, with his slaty head and neck, bright yellow underparts, and olive-green back is one of the most abundant birds of the park, his leisurely rather throaty *tur-tur-tur-turty-tah* being heard not only from the willow thickets but from the chaparral of the mountain slopes. The songster may sometimes be discovered throwing back his head to sing from the tip of an evergreen spire, and sometimes caught giving a delightful flight song over the bushes.

From Handbook of Birds. (Fuertes.)

FIG. 86.—Macgillivray warbler.

WESTERN YELLOW-THROAT: *Geothlypis trichas occidentalis.*—During the nesting season the *witch-awee'*, *witch-awee'*, *witch-awee'* of the yellow-throat was heard from the willows near the tepees on Lake McDermott, and, by quietly watching, the busy songster with black mask, yellow breast, and olive back was caught sight of in passing.

Below McDermott Falls, in a willow and spruce thicket protected from the wind by a high mountain wall, where fragrant ladies' tresses and pink castillejas brightened the ground, the birds of the neighborhood—yellow warblers, white-crowned sparrows, Swainson vireos, ruby kinglets, Macgillivray warblers, and yellow-throats—were gathered one sunny morning holding a merry concert. The yellow-throat brought out all his best variations—*wree-cha-ree'*, *wree-cha-ree'*, *wree-cha-ree'*, *witch-awee-witch'*, *witch-awee-witch'*, and *witch-awee-witch' ah.*

From Handbook of Birds. (Fuertes.)

FIG. 87.—Western yellow-throat.

Below St. Mary Chalet, late in July, a yellow-throat was seen carrying food, and as late as August one was seen giving his flight song over the willows.

PILEOLATED WARBLER: *Wilsonia pusilla pileolata.*—The jaunty little black-capped yellow warblers were found in the bushes in a number of places, notably at Glacier Park, Swiftcurrent Flats, Gunsight Lake, Waterton Valley, the Kootenai Trail, and Lake McDonald. One was seen July 13, at Lake McDermott, carrying food.

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REDSTART: *Setophaga ruticilla.*—Mr. Bryant records the redstart from the North Fork of the Flathead, and in 1895 Messrs. Bailey and Howell saw several males at the St. Mary Lakes.

In a country where they are uncommon the sudden sight of a striking bird like the black and orange redstart, with its long, fan-tail, seems an experience worth recording. We saw three—one at Glacier Park, one near the Reynolds cabin in the Waterton Valley, and one at Lake McDonald, each bringing the thrill of surprise and pleasure of an unexpected meeting with an old friend.

Family MOTACILLIDÆ: Wagtails.

PIPIT: *Anthus spinoletta rubescens.*—On the timberline slopes of the park, stony and flower strewn, in company with the leucosticte and ptarmigan, one finds the pipit, smaller and more slender than the rosy finch, and without his charming touches of color, but a hardy little mountain friend for all of that, with a dull brownish suit to protect him from enemies, and white enough on the outer edge of his dark square tail to help his family follow his flight. Better known when he is going about in flocks on the lowlands in the migrations and winter months, he may be recognized on his Arctic Alpine breeding grounds by his deliberate walk, his habit of tipping his tail, and occasionally nodding his head, and also by his plaintive *ke'-we* and *cheep'-ep*, uttered as he flies about, buffeted by a wind often too strong to stand against, and which sometimes blows him back against a snowbank.

A record of one's meetings with Anthus becomes a record of the peaks and passes visited, for while both ptarmigan and leucosticte are often overlooked on hurried visits, Anthus is generally in evidence. We found old ones feeding young at Siyeh Pass, Gunsight Pass, Piegan Pass, and Kootenai Pass, and saw them flying around on the slopes adjoining Blackfeet Glacier. Dr. Grinnell, in the St. Mary Lakes region, found them also on Flat Top, Goat Mountain, and Red Eagle Mountain.

Sometimes the pipits were found flying about over bare steep slide rock; once they kept me waiting for a long time on the edge of a canyon, flying from rock to rock, one of them finally eating up the insects it had gathered rather than show me the hiding place of its brood. On Gunsight Pass, where siskins flew overhead and leucostictes called around the peaks, the broken faces of strata registered the titanic convulsions of geologic ages, but the gentle hand of time had lain disguising carpets of heather and moss and dwarf firs, and conies squeaked from the interstices of coarse rock slides. Here the familiar voice of the pipit was heard from rock masses above and below, and round about us we discovered the little forms

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of well-grown young—yellowish-breasted young that tilted their tails like their parents, but still had a decided air of staying where they were put—an air whose reason was explained when their business-like, knowing parents quietly whisked them out of danger's way.

Family CINCLIDÆ: Dippers.

WATER OUZEL: *Cinclus mexicanus unicolor.*—The water ouzel, also called dipper from its wren-like habit of bobbing or dipping, one of the most remarkable birds of the West, can be easily watched at its nest by even the hurried visitor to the park. From the bridge over

Photo. by J. Rowley. Courtesy of Bird-Lore.

FIG. 88.—Water ouzel at entrance to nest.

the Swiftcurrent—only a few steps from Many Glaciers Hotel—where trains of saddle horses and automobile stages go rushing by, a pair of the short-tailed gray "water wrens" were seen flying swiftly low over the water on their way back and forth between their feeding grounds along the lake above and their nest at the foot of the waterfall below. And from the top of the gorge, marking the his-

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Photo. by H. W. Nash.

A COLORADO WATER OUZEL'S NEST WITH TWO YOUNG INSIDE.

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toric Lewis Overthrust Fault of the map, the ouzel was watched through the glass flying down over the white roaring waterfall, turning a shielding point of rock, and buzzing like a hummingbird in front of a ledge before the open mouth of a domed mossy nest from which, with a noisy welcome, widely gaping yellow bills reached down to be fed. Then off like a flash, the eager parent flew over the frothing swirling water and through the wind-blown spray back up the tumbling falls to its hunting ground on the lake above.

When tired perhaps by strenuously climbing waterfalls, one of the pair went hunting below along the bank of the creek, and an observer new to water ouzels and their strange ways, catching the enthusiasm of first-hand knowledge, exclaimed excitedly, "*He went right down under water!* He went down *under water!*" When, lured by some tempting morsel at the bottom of the creek, the little water wren, secure in his oilskin suit, does go below in this way, he often swims along a bit before coming up, though boasting no webbed feet to paddle with. A commoner "stunt" is to stand on a rock—like the large one in the middle of Swiftcurrent facing his nest, which holds a basin of water—and plunge his head in up to his body, giving an amusing headless horseman effect.

At this time of year he had little need to hunt under water, for banks and shores and ledges were fairly alive with caddice flies just coming out of their cases, and we could see long wings in the bills of the parents. The family providers had long hours to work here in the north where daylight lasts so late. One was actually seen taking food to the nest at 9 o'clock at night. And by 6—and no one knows how much earlier—the pair were at work again the next morning. When the sun first came into the cold gorge of the glacial stream, the father of the family, sitting on the rock in the middle of the creek, burst into song and sang jubilantly for some time, but then stopped short and began the work of his long busy day.

When the sun got in far enough to light up the nest the picture from the bottom of the gorge facing it was a pretty one, though the strong draft sweeping through shook the legs of the tripod disastrously, and the dashing spray clouded the lens. The mossy nest, resting on a narrow shelf several feet above the roaring stream, was securely wedged in under a roofing ledge. Dark mosses growing over the ledges and small bright green ferns on either side of the nest itself added to the attractiveness of the picture. What a home the little water wrens had chosen! How they must love the rush and roar of water, the exhilaration of wind-blown spray, the music of the cascades, and the privacy of their rainbow-arched gorge beyond whose white waterfalls looms the noble head of Grinnell Mountain under resplendent clouds!

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But what would happen to the young when they left the nest? Would they fall into the frothing, swirling torrent and be washed downstream? Their parents had no such anxieties. Ledges and caverns that seemed fairly negligible from the top of the gorge, from below proved veritable mammoth caves for exploration by fledgelings. And if a too-venturesome one went too close to the water, a thud of spray on its back taught it a lesson.

Another ouzel's nest, this time about 30 feet above the creek on the ledges besides Baring Falls, was one of the prime interests of visitors to Going-to-the-sun Camp, and while the nest itself was protected from the too curious by the heavy spray of the cataract, in going to and from it the ouzels sometimes—as on the occasion of the visit of the Howard Eaton party—had to run the gauntlet of a long row of spectators.

After the nesting season two nests were found near the falls of McDonald Creek where the harlequins rode the rapids. Ouzels were seen flying up the beautiful waterfall—split by red rocks—just off the Granite Park trail, and they probably had a nest at its foot. In a number of other places in the park the birds were seen in passing, either about falls or flying swiftly up or down mountain streams. They were so busy feeding young that their song was seldom heard; but it is a delightful one, that should be carefully listened for, and that may be heard in the park in winter.

In writing of winter experiences with the ouzels Mr. Higginson says: "I very much doubt if the weather ever comes that drives these birds to take shelter. On a day in January, with the thermometer at 35° below zero and everything combining to make the weather unbearable, I heard one of these birds, and looking out discovered him sitting on a little rock in the middle of an icy mountain stream pouring forth his song at the very top of his little lungs. Many people do not know what a sweet song the dipper possesses, as sweet a strain as one often hears, poured out with all the subdued energy of the winter wren, whose song it sometimes resembles."

The hardy little musicians are early builders. On April 21, 1918, Mr. Bailey found a pair carrying building material under the Fish Creek log bridge near Lake McDonald, and the next day found a pair lining their nearly completed nest in a niche of the rock wall below the falls on McDonald Creek, where he had found two old nests the previous summer.

Family MIMIDÆ: Mockingbirds, Catbirds, etc.

CATBIRD: *Dumetella carolinensis.*—At the upper St. Mary Lake, July 21, when looking for new and strange harlequin ducks, I was surprised to come face to face with a homelike catbird, with slate-

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Courtesy of National Association of Audubon Societies.

CATBIRDS AT NEST.

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gray body and black crown and tail, sitting in the bushes on the lake shore, looking conscious of observation, but unafraid.

The bird has been seen by Mr. Bryant, both in the park and on the Flathead, and in June, 1895, Messrs. Bailey and Howell reported one or two seen on Willow Creek near the Blackfeet Agency, now Browning.

Family TROGLODYTIDÆ: Wrens.

ROCK WREN: *Salpinctes obsoletus obsoletus.*—Although the rock wren is mainly a bird of warmer zones, it has been reported by so many observers that it should be sharply looked for. Its wrennish figure and graduated tail with subterminal band of black, held like a spread fan tilted up at its back, are enough to identify it.

Dr. Grinnell writes me that he has an impression that he has seen it on the east side of the park, and the botanist, Mr. Marcus E. Jones, unqualifiedly records seeing it "among the rocks." Mr. Bryant has never collected it, but feels confident that he has seen it, as do Mr. Gibb and Mr. Gird.

From Handbook of Western Birds.

FIG. 89.—Western house wren.

WESTERN HOUSE WREN: *Troglodytes aëdon parkmani.*—The house wren was found August 5 on Swiftcurrent Creek, a mile below Many Glaciers, singing volubly and acting interested in a hole in a stub. Mr. Gibb says a number of the wrens are seen around Lewis's on Lake McDonald.

WESTERN WINTER WREN: *Nannus hiemalis pacificus.*—Along the Gunsight Trail we heard the tinkling song of the little bobtailed winter wren coming from a dark thicket in the mossy woods; and again at Wall Lake, before a thunderstorm had cleared, the gloom of the well-like cirque and its black water bordered by dark spruce woods was relieved by the sprightly song of the jolly little wren.

But not until we were following the bear-tracked Kootenai trail through the dark Engelmann spruce forest did we get our first sight of the brown mite. On the trail beside some fallen logs we were arrested by its "watch-winding" scold, as Mr. Bailey expressed it, and discovered a pair of old wrens with stubby tails up over their backs, and one fuzzy-headed, yellow-gaped youngster just out of the nest. With quivering wings and twitching tail, the parent on guard scolded around in nervous solicitude, not daring to call attention to the youngster by feeding it even when food was brought. Occasion-

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ally the two-syllabled *ta-tib'* was given, but generally it was the long scolding chatter. When finally relieved of our presence the parents expressed their feelings in various low notes followed by their sweet tinkling song. The nest of the wrens is described by Mr. Stevenson as "a small oven made of moss on the side of a rotten log."

One of the winter wrens was seen by Mr. Gibb in July on Lake Josephine, and Mr. Bryant, of California, when in the park heard them in many places and found them "much in evidence along Lake McDonald and McDonald Creek." Mr. E. S. Bryant says they are common all winter.

In April, 1918, Mr. Bailey found them "singing in many places along the way," up the North Fork of the Flathead, and says: "One was living under some logs of the road grade on the Fish Creek hill, where four feet of snow covered his dark, cold den. He would come out and bubble away as if the flowers were blooming, then dive back into the black caverns under the snow bank."

Photograph by R. B. Rockwell.

FIG. 90.—Young Rocky Mountain nuthatches.

Family CERTHIIDÆ: Creepers.

ROCKY MOUNTAIN CREEPER: *Certhia familiaris montana.*—The little bark-colored creeper, rocking up to the top of one tree trunk and then flying down to the foot of another to start over again in his search for bark insects, may be easily overlooked in the dense coniferous forest; but his small beady note on the order of the waxwings, when once heard will readily place him. Only one was seen, but a number were heard during the summer in various parts of the park.

Family SITTIDÆ: Nuthatches.

ROCKY MOUNTAIN NUTHATCH: *Sitta carolinensis nelsoni.*—The small short-tailed bluish gray bird with black crown and plain white

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cheeks, seen walking head down on the side of a tree trunk, was found on all sides of the park, notably at Many Glaciers, Going-to-the-sun Camp, Waterton Valley, Kootenai Trail, and Lake McDonald. It is less frequently seen than heard, its soft *henk-henk-henk-henk*, catching the ear from a distance. Sometimes it is only a flute-like *hank* that penetrates the woods, but it is redolent of balsamic odors and the still depths of the forest.

RED-BREASTED NUTHATCH: *Sitta canadensis*.—The red-breasted nuthatch with black and white stripes on the side of its head was seen, August 30, at Lake McDonald. Mr. Bryant, of California, found it there on July 18, and on McDonald Creek July 31. In June, 1895, Messrs. Bailey and Howell reported it from St. Mary Lake as "quite common around camp." In the winter of 1899–1900 Mr. Higginson found both it and the white-breasted around Stanton Lake, "more frequently on the highland."

Photograph by E. R. Warren.

FIG. 91.—Long-tailed chickadee.

Family PARIDÆ: Titmice.

LONG-TAILED CHICKADEE: *Penthestes atricapillus septentrionalis*.—As several species of chickadees may be found in the park, the flocks should be examined carefully. The long-tailed, with its plain white cheeks and underparts and its pale gray back, was seen on Swiftcurrent Creek, Kootenai Trail, and Lake McDonald, families of grown young being found in the forest in many places, although the birds are more likely to breed in the partly open valleys.

In April, 1918, Mr. Bailey found the long-tailed chickadees common from Belton to the Kintla Lakes, especially along the willow bottoms.

MOUNTAIN CHICKADEE: *Penthestes gambeli gambeli*.—Mountain chickadees, easily recognized by the white line over the eye, are common in the park, so that their delightful and varied notes may be studied at will. In speaking of the birds around his winter camp at Stanton Lake, Mr. Higginson wrote, "Of course the chickadees

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were our ever faithful neighbors during the winter. When other birds were in hiding, in cold or stormy weather, these little fellows would come around the camp and cheer us up with their incessant song."

Photograph by E. R. Warren.

FIG. 92.—Mountain chickadee.

CHESTNUT-BACKED CHICKADEE: *Penthestes rufescens rufescens* (*?*).—In the dense cedar, tamarack, and hemlock woods bordering Lake McDonald, August 26, we saw what, with the unsatisfactory glimpses vouchsafed us, appeared to be the chestnut-backed, with top and back of head hair-brown, and back, sides, and flanks dark reddish brown.

Family SYLVIIDÆ: Kinglets, etc.

WESTERN GOLDEN-CROWNED KINGLET: *Regulus satrapa olivaceus*.—On the park side of the North Fork of the Flathead at Belton, August 31, a golden-crowned kinglet was seen with a flock of chickadees, and at Stanton Lake Mr. Higginson found one or more with every flock of chickadees. A few kinglets were seen by Mr. Bailey on April 16, 1918, at Kintla Lake. Dr. Grinnell says that he has seen them a number of times on the east side of the park.

RUBY-CROWNED KINGLET: *Corthylio calendula calendula*.—Frequently heard among the firs and spruces of the park, the rippling, charming song of the ruby kinglet, often given sotto voce, sometimes suggests the reading, "*Roundelay, roundelay, roundelay, cheery, cheery, cheery, cheery, cheer*," ending with a *tsche-da, tsche-da, tsche-da.*

When the lovely tripping song had been heard a great deal on the east side of Lake Josephine, on going along the west side of Lake McDermott one morning I caught sight of a little green woodlander with big eyes and a scarlet cap on his head, standing in a spruce near the trail. At the same time he caught sight of me, and after fluttering his wings and giving a few chattering notes, stopped short. Wanting to sing, he started with the first merry notes, but, remembering me, changed to a worried call—a single, rich, throaty note that he

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kept repeating for some time. Then, as I looked on quietly and unobtrusively, he apparently dismissed me from his mind and went about hunting insects. When he had gathered so many that they showed in his bill he could contain himself no longer and burst out with his gay, light-hearted round—*hi-oh, hi-oh, hi-oh, hi-oh, hi.*

At Gunsight Lake, the last of July, I happened on a family of very spruce-looking, recently fledged little kings whose busy, harried mother looked as if she had not had time to plume herself. A month later, when family cares were over for the year, at Lake McDonald a ruby was seen going about with a flock of chickadees and warblers, again singing snatches of his carefree, light-hearted song.

Family TURDIDÆ: Thrushes, Solitaires, Bluebirds, etc.

TOWNSEND SOLITAIRE: *Myadestes townsendi.*—The solitaire—a gray bird a little smaller than a mockingbird, with a very short bill, in flight showing a line down the wing—was seen a number of times in the park. As I had generally seen the solitaires high up on the mountains I was surprised to discover one sitting in a tree a few yards from the back of Many Glaciers Hotel. While I stared he flew down on the edge of the lake looking about with utmost composure. The same one, as I imagined, was seen several times at the tepee end of the lake, and one day in the middle of July there were two evidently getting food, as they flew low and then returned to the tree tops; but though I looked carefully for young and followed when they left, they quickly disappeared ahead of me in the dense forest. At all our meetings they had maintained strict silence—except for a rich call note suggesting the rare quality of their song—the silence, as I interpreted it, of parents guarding young. But on July 24, near Going-to-the-Sun Camp, one of the birds, apparently accompanied by grown young, sang soft broken snatches of song that made me long to hear again the full rhapsody of the mountain tops. My only other meeting with the rare songster was at Crossley Lake, when, silent and flitting, he stopped for a few moments in the top of a lodgepole pine on the moraine above the lake. In the nesting season of 1895 a pair were found above timberline near Midvale.

WILLOW THRUSH: *Hylocichla fuscescens salicicola.*—The pale buffy chest with its triangular spots, together with the uniform olive brown of the upper parts, identify the willow thrush when seen; but, like all the thrushes, quiet brown-backed birds of the woodland, in a country of dense forest growth he is very difficult to see. His calls, among them the familiar bleat and the appealing *whee' you* of his eastern congener, the veery, were apparently heard in the willow thickets of the lower part of the park, and Mr. Bryant, of California, reported hearing the songs at Lake McDonald and St. Mary Lake. The exqui-

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site song of the *fuscescens* has been described as a series of descending silver rings, but that only gives a hint of its rare quality and charm.

OLIVE-BACKED THRUSH: *Hylocichla ustulata swainsoni.*—The olive-backed—distinguished from the willow by its bright buffy throat, its more heavily marked breast, and especially by its buffy cheeks and eye ring—and distinguished from the red-tailed Audubon hermit by having the tail nearly the same color as the back, is said, by Mr. Bryant, to breed in the park. A nest that we took for a *swainsoni* was found near Glenn Lake, in a small balsam about 10 feet from the ground, and was loosely made of soft black and green bearded lichens, moss, and grass, lined with lichen. It contained one young bird and one dull-green egg lightly spotted with brownish.

The loud beautiful song of the olive-back whose effect, as it is said, "is much enhanced by the evening hush in which it is most often heard," must be listened to carefully to distinguish it from that of the Audubon hermit. Not only do its cadences ascend rather than descend, but, as Dr. Jonathan Dwight describes the song, it "lacks the leisurely sweetness of the hermit thrush's outpourings, nor is there pause, but in lower key and with greater energy it bubbles on rapidly to a close rather than fading out with the soft melody of its renowned rival."

AUDUBON HERMIT THRUSH: *Hylocichla guttata auduboni.*—Two Audubon thrushes seen at the Grinnell water-thrush pond on Lake McDonald close enough for a distinct view of their diagnostic reddish brown tails, were probably migrants, but four others were seen or heard during the nesting season, two of them close enough for identification.

The songs heard were, curiously enough, associated with particularly impressive mountain views. On the trail to Iceberg Lake, when we had been slowly climbing up through the dark forest of close-set shaggy firs and spruces, with only an occasional sunbeam lighting up a green fern bed, a patch of lemon yellow lichen, or a clump of magenta Mimulus, suddenly, at a turn, we rode out of the shadowed forest and looked across a great space upon the Swiftcurrent glacier and the noble peak of Grinnell Mountain. As we gazed, spellbound, at the landscape, over our heads came the thrilling, exalted song of the Audubon hermit, unheard before in the mountains, with its sublimated refrain—"*High above you, high above you.*" Farther along the trail, when once more we rode out of the shadowed forest for our first inspiring view of the uplifted head of Mount Wilbur and the glacier above Glacier Lake, we were again thrilled by the exalted song with its cool, serene notes—"*High above you, high above you.*"

WESTERN ROBIN: *Planesticus migratorius propinquus.*—Familar homelike robins, practically indistinguishable from the eastern, were nesting on beams under the eaves at Glacier Park Hotel and at Many

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From Handbook of Birds of the Western United States.

NORTHERN VARIED THRUSH.

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Glaciers, and they are said to nest commonly in suitable localities throughout the park.

Some of the robins winter as far north as southern British Columbia, and from April 9–19, 1918, Mr. Bailey found them common from Belton up through the North Fork valley, especially from Dutch Creek to Big Prairie. "At Adair's ranch they were numerous, and busy hunting worms in the meadow and singing from the tree tops."

NORTHERN VARIED THRUSH: *Ixoreus nævius meruloides*.—The varied thrush, whose size and rusty brown breast might suggest a rusty robin with a black necklace, was seen or heard in a number of places

Photograph by E. R. Warren.

FIG. 93.—Western robin.

during the nesting season; and Mr. Bryant says it winters half way up the mountains, in the heavy timber near open water or springs, where it can doubtless find berries, such as mountain ash, high-bush cranberry, and yew. On April 9, 1918, Mr. Bailey found varied thrushes singing on both sides of the river at Belton, and during the next two weeks found them around Lake McDonald and at various points along the North Fork nearly to Kintla Creek, their long thrilling note often coming from deep woods where there was still two or three feet of snow.

In August, on the Kootenai Trail near the home of the winter wren family, a spotted-breasted young varied thrush was seen in a

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spruce, and a whistled call brought a response of rare unmistakable quality from its parent. And once on the south side of Lake Josephine my ear caught the famous note that holds the rapt sublimation of the songs of all the thrushes. It was only given twice, but that was enough to thrill me with the knowledge that the rare musicians were in the park.

At the head of Grinnell Lake in July, after leaving our saddle horses at a large snowbank, I followed along the shore until I discovered a diving golden-eye. While quietly watching her, the voice of a varied thrush was heard, and soon two of the birds flew swiftly down through the evergreens, so close to me that I could see their brown, collared breasts. Another interval of silence and from the trees almost over my head came the split, vibrant note, later followed by a soft tinkling note as of birds undisturbed in their home. And what an ideal place for the Alaska mountain dweller—on the spruce-clad wall overlooking the milky glacial lake, with the notes of nutcrackers given in passing over from the peaks! Weeks passed before I was able to return to the home of the varied thrush, but then, on the way back from Gunsight and Piegan Pass, as I rode down into the beautiful secluded gulch beside Grinnell Glacier, the vibrant swelling note caught my waiting ear. Dismounting and answering each call as it came—now the split note and now the long swelling note—I followed the direction of the sound till I stood at the foot of a noble brotherhood of dark-green, high-pointed spruces, from which the rare song came. On recounting the circumstance to Dr. Grinnell soon after, when he was visiting one of our camps, he told me that he had found the varied thrushes in that very same gulch, as he remembered, some twenty-six years before, many years before the park had been established!

In still another of nature's secluded chambers was the note of the varied thrush heard—in the amphitheater of Iceberg Lake, where the presence of man seemed an intrusion and the sublimed voice of the bird in rare harmony. Silenced by the arrival of the horse trains, only one note was given, but a quiet walker who had preceded us said that before we came the thrush had been singing marvelously.

MOUNTAIN BLUEBIRD: *Sialia currucoides*.—Like its eastern relative, a bird of the open, the mountain bluebird, associated with the beautiful mountain parks and meadows of the West, in Glacier Park is found in the open lower margins, such as the region of St. Mary Lake and the North Fork of the Flathead.

Some of the pleasantest experiences of the summer, which was filled with delightful incidents, were at Glacier Park Hotel, at the

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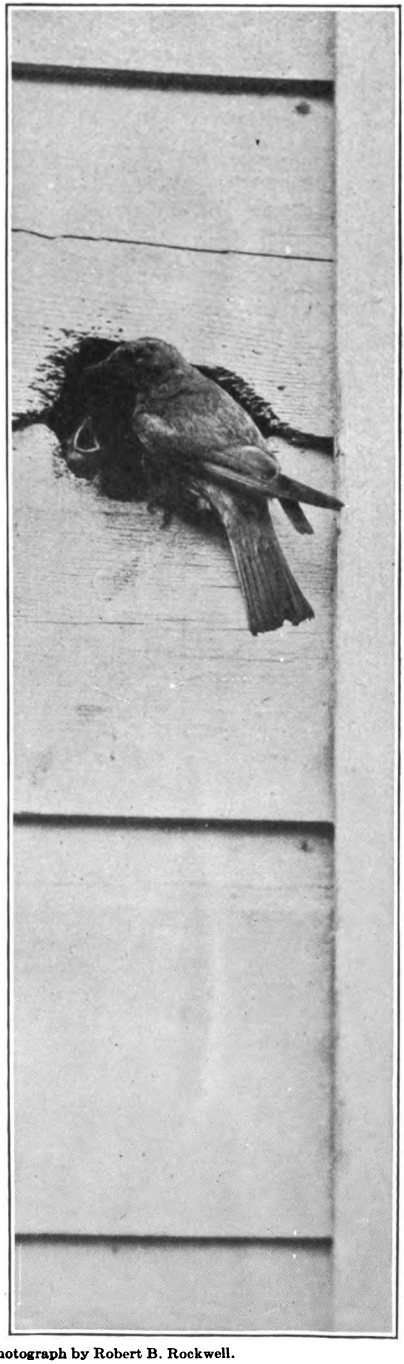
entrance to the park, for there, besides being welcomed by the rich song of a thrush coming from the willow thickets under our windows and hearing the homelike notes of nesting robins, we found a pair of the exquisitely tinted mountain bluebirds, most beautiful of all the lovely bluebirds, actually nesting in an old woodpecker hole in one of the great yellow-pine pillars of the hotel. How touching it seemed that the grand old tree, felled in its might and carried far from its forest home, had brought shelter for the gentle pair, helpless to excavate a nest of their own and otherwise unprovided! A pretty sight the father bluebird made sitting on a beam close to the nest while the mother brooded inside.

At Many Glaciers nature had made no such kindly provision for the bluebirds, and, as the slender young trees around the hotel offered no natural nesting boxes and man had failed to supply the deficiency, a pair seeking the shelter and protection of the hotel were sorely put to it. At last, trying to forget family traditions, they built on a rafter at the end of the piazza, over the heads of the hotel guests promenading back and forth enjoying the wonderful views of the mountains reflected in the lake. Shy and nervous in such an unnatural position, the gentle birds made a pathetic appeal for hospitality; and how well they would repay it, numbered as they are among the loveliest birds of the West!



Photograph by Robert B. Rockwell.

FIG. 94.—Mountain bluebird.

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INDEX.

A.

Acanthis linaria linaria, 174.
Accipiter cooperi, 146.
velox, 146.
Actæa, 56.
Actitis macularia, 133.
Echmophorus occidentalis, 110.
Aëronautes melanoleucus, 162.
Agelaius phœniceus fortis, 169.
Aix sponsa, 120.
Alaska longspur, 175.
three-toed woodpecker, 158.
Alaudidæ, 165.
Alcedinidæ, 157.
Alces americanus americanus, 31.
Alders, 21.
Amelanchier alnifolia, 95.
American elk, 32.
moose, 31.
Anas platyrhyncha, 117.
Anatidæ, 115.
Anseres, 115.
Antelope, prong-horned, 31.
Anthus spinoletta rubescens, 187.
Antilocapra americana americana, 31.
Antilocapridæ, 31.
Aquila chrysaëtos, 148.
Archibuteo ferrugineus, 147.
Archilochus alexandri, 162.
Arctic-Alpine Zone, 23.
towhee, 179.
Arctostaphylos uva-ursi, 95.
Ardea herodias herodias, 131.
Ardeidæ, 129.
Arenaria, 22.
Arnica, golden, 21, 22.
Asio flammeus flammeus, 154.
Aspen, 20.
Aster, golden, 22.
prairie, 19.
purple, 21.
Astur gentilis striatulus, 147.
Asyndesmus lewisi, 161.
Audubon hermit thrush, 196.
warbler, 187.
Avocet, 132.

B.

Badger, 91.
Bald eagle, 149.
Baldpate, 118.
Balsam root, 19.
Bank swallow, 182.
Barn swallow, 181.
Barrow golden-eye, 122.
Bartramia longicauda, 133.
Bat, brown, 101.
hoary, 101.
long-legged, 100.
silver-haired, 101.
Batchelder woodpecker, 158.
Bear, black, 91.
cinnamon, 91.
grizzly, 96.
silvertip, 96.
Bear-berry, 94.
Bear grass, 21, 94.
Bear paw, 21.
Beaver, 64.
Belted kingfisher, 157.
Bighorn, 26.
Birch, paper, 21.
shrubby, 21.
western, 20.
Bison, 25.
Bittern, 129.
Bitterroot, dwarf, 23.
Black and white warbler, 183.
Black-bellied plover, 134.
Blackbird, Brewer, 170.
redwing, thick-billed, 169.
Black-chinned hummingbird, 162.
Black-headed grosbeak, 179.
jay, 165.
Blazing star, 19.
Blueberry, little red, 21.
purple mountain, 21.

Digitized by Google

Bluebird, mountain, 198.
Bluebonnet, 19.
Blue-winged teal, 119.
Bobcat, northern, 82.
Bob-white, 135.
Bohemian waxwing, 182.
Bombycilla cedrorum, 182.
garrula pallidiceps, 182.
Bombycillidæ, 182.
Bonaparte gull, 114.
Bonasa umbellus umbelloides, 137.
Botaurus lentiginosus, 129.
Branta canadensis canadensis, 127.
Brewer blackbird, 170.
Broad-tailed hummingbird, 163.
Brown bat, 101.
Brown-eyed Susan, 19.
Brown woodchuck, 53.
Bubonidæ, 154.
Bubo virginianus occidentalis, 156.
subarcticus, 156.
Buffalo, 25.
Buffalo berry, Canadian, 21.
Buffle-head, 124.
Bunting, lazuli, 180.
snow, 175.
Buteo borealis calurus, 147.
Buteonidæ, 146.
Buteo swainsoni, 147.
Buttercup, 22, 23.

C.

Calcarius lapponicus alascensis, 175.
ornatus, 175.
Calliope hummingbird, 163.
Callospermophilus lateralis cinerascens, 43.
Camp bird, 166.
Canachites franklini, 136.
Canada goose, 127.
lynx, 81.
Canadian curlew, 134.
Zone, 20.
Canidæ, 82.
Canis latrans, 83.
nebracensis, 83.
nubilus, 82.
Canvasback, 121.
Carnivora, 79.
Carpodacus cassini, 172.
Cassin purple finch, 172.
Castor canadensis canadensis, 64.
Castoridæ, 64.
Catbird, 190.
Cathartes aura septentrionalis, 145.
Cathartidæ, 145.
Ceanothus sanguineus, 20.
Cedar waxwing, 182.
Cedar, yellow, 21.
Cerchneis sparveria phalæna, 150.
Certhia familiaris montana, 192.
Certhiidæ, 192.
Cervidæ, 31.
Cervus canadensis canadensis, 32.
Chætura vauxi, 162.
Charadriidæ, 134.
Charitonetta albeola, 124.
Chaulelasmus streperus, 118.
Chen hyperborea hyperborea, 127.
rossi, 127.
Chestnut-backed chickadee, 194.
Chestnut-collared longspur, 175.
Chickadee, chestnut-backed, 194.
long-tailed, 193.
mountain, 193.
Chipmunk, forest, 42.
mountain, 42.
yellow-bellied, 42.
Chiroptera, 100.
Chondestes grammacus strigatus, 176.
Chordeiles minor hesperis, 161.
Chordeilidæ, 161.
Cinclidæ, 188.
Cinclus mexicanus unicolor, 188.
Cinnamon teal, 119.
Cinquefoil, 22, 23.
Circus cyaneus hudsonius, 146.
Citellus columbianus, 45, 95.
richardsoni, 49.
tridecemlineatus pallidus, 50.
Clangula islandica, 122.
Clark crow, 167.
nutcracker, 167.
Clematis, 21.
Cliff rat, 53.
swallow, 180.
Clintonia uniflora, 21.
Coccyges, 157.
Colaptes cafer collaris, 161.
Colinus virginianus virginianus, 135.
Columbæ, 145.
Columbia ground squirrel, 45.
Columbian sharp-tailed grouse, 145.
Columbidæ, 145.
Columbine, dwarf blue, 23.
yellow, 21.
Colymbidæ, 110.

Digitized by Google

Colymbus auritus, 112.
holbœlli, 111.
nigricollis californicus, 112.
Cony, 75.
Cooper hawk, 146.
Coot, 132.
Cormorant, double-crested, 115.
Corthylio calendula calendula, 194.
Corvidæ, 165.
Corvus brachyrhynchos hesperis, 167.
corax sinuatus, 167.
Cottonwood, black, 20.
Cougar, 79.
Cowbird, sagebrush, 169.
Cow parsnip, 94.
Coyote, northern, 83.
Crane, sandhill, 131.
Cratægus douglasi, 95.
Creeper, Rocky Mountain, 192.
Crossbill, 173.
white-winged, 173.
Crow, Clark, 167.
western, 167.
Cryptoglaux acadica acadica, 155.
funerea richardsoni, 154.
Cuckoo, 157.
Curlew, Canadian, 134.
Currant, 21.
Cyanocitta stelleri annectens, 165.

D.

Dafila acuta tzitzihoa, 120.
Deer, mule, 33.
white-tail, 35.
Dendragapus obscurus richardsoni, 135.
Dendroica æstiva æstiva, 183.
auduboni auduboni, 183.
townsendi, 184.
Desert horned lark, 165.
sparrow hawk, 149.
Devil's-club, 21.
Diamond willow, 19.
Dipper, 188.
Dobson shrew, 99.
Dogtooth violet, 21, 22, 47, 94.
Double-crested cormorant, 165.
Dove, western mourning, 145.
Drummond meadow mouse, 63.
Dryas octopetala, 22, 140.
Dryobates pubescens homorus, 158.
villosus monticola, 158.
Duck hawk, 149.
Ducks, 115.
Ducks—Continued.
baldpate, 118.
Barrow golden-eye, 122.
buffle-head, 124.
canvas-back, 121.
gadwall, 118.
lesser scaup, 121.
mallard, 117.
pintail, 120.
redhead, 121.
ring-necked, 122.
ruddy, 127.
scaup, 121.
western harlequin, 124.
white-winged scoter, 127.
wood, 120.
Dumetella carolinensis, 190.
Dusky shrew, 98.
Dwarf blueberry, 22.

E.

Eagle, bald, 149.
golden, 148.
Eared grebe, 112.
Elder, black-berried, 21.
red-berried, 21.
Elephant heads, 22.
Elk, American, 32.
Empidonax difficilis difficilis, 164.
hammondi, 165.
trailli trailli, 164.
Engelmann spruce, 20, 22.
Eptesicus fuscus fuscus, 101.
Erethizon epixanthum epixanthum, 66.
Erethizontidæ, 66.
Erismatura jamaicensis, 127.
Erythronium grandiflorum, 21.
Euphagus cyanocephalus, 170.
Eutamias luteiventris, 40.
oreocetes, 42.
umbrinus felix, 42.
Evening primrose, mountain, 22.
Evotomys gapperi galei, 60.

F.

Falcon, prairie, 149.
Felidæ, 79.
Felis hippolestes, 79.
Fiber zibethicus osoyoosensis, 63.
Finch, Cassin purple, 172.
Fireweed, 21.
Fir, grand, 21.
Fish hawk, 150.

Digitized by Google

Fisher, 90.
Flicker, red-shafted, 161.
Flickertail, 92.
Flycatcher, Hammond, 165.
olive-sided, 164.
Traill, 164.
western, 164.
Flying squirrel, 39.
Forest chipmunk, 42.
Forget-me-not, 23.
false, 21.
Forster tern, 114.
Fox, cross, 84.
kit, 85.
mountain red, 84.
Franklin grouse, 136.
Fringillidæ, 171.
Frogs, 18.
Fulica americana, 132.

G.

Gadwall, 118.
Gallinæ, 135.
Gallinago delicata, 132.
Gambel sparrow, 177.
Garter snakes, 18.
Gavia immer, 113.
Gaviidæ, 113.
Gentian, 22.
Geomyidæ, 71.
Geothlypis trichas occidentalis, 186.
Geranium, 19.
Glacier hoary marmot, 50.
Glaucidium gnoma pinicola, 157.
Glaucomys sabrinus, 39.
bangsi, 39.
latipes, 39.
Globe flower, 22.
Godetia quadrivulnera, 22.
Golden eagle, 148.
Goldenrod, 21.
Gooseberry, 21.
Goose, Canada, 127.
Ross, 127.
snow, 127.
Gray-crowned leucosticte, 173.
Gray wolf, 82.
Great blue heron, 137.
Greater yellow-legs, 133.
Grebe, eared, 112.
Holbœll, 111.
horned, 112.
swan, 110.
western, 110.
Green-winged teal, 118.
Grinnell water-thrush, 184.
Grosbeak, black-headed, 179.
Rocky Mountain, 171.
western evening, 171.
Ground squirrel, Columbia, 45.
mantled, 43.
Richardson, 49.
striped, 50.
Grouse, Columbian sharp-tailed, 145.
Franklin, 136, 157.
gray ruffed, 137.
Richardson, 135.
Gruidæ, 131.
Grus canadensis mexicana, 131.
Gull, Bonaparte, 114.
California, 114.
ring-billed, 114.
Gulo luscus, 90.

H.

Haliæetus leucocephalus leucocephalus 149.
Hammond flycatcher, 165.
Hare, little chief, 75.
Harebell, alpine, 23.
Hawk, Cooper, 146.
desert sparrow, 149.
duck, 149.
fish, 150.
marsh, 146.
mouse, 146.
pigeon, 149.
prairie falcon, 149.
sharp-shinned, 146.
squirrel, 147.
Swainson, 147.
western goshawk, 147.
western red-tail, 147.
Hawk owl, 156.
Hawk-weed, 22.
Heather, purple and white, 22.
Hellebore, green flowered, 21.
Helodromas solitarius cinnamoneus, 133.
Hemlock, western, 21.
Heracleum lanatum, 94.
Herodiones, 129.
Heron, great blue, 131.
Herring gull, 114.
Hesperiphona vespertina brooksi, 171.
Hierofalco mexicanus, 149.
Hirundinidæ, 180.

Digitized by Google

Irundo rustica erythrogastris, 180.
Istrionicus histrionicus pacificus, 124.
Oary bat, 101.
Oary marmot, glacier, 50.
Olbœll grebe, 111.
Oneysuckle, black-berried, 21, 136.
red-berried, 21.
Ooded merganser, 116.
Orned grebe, 112.
Udsonian Zone, 22.
Ummingbird, black-chinned, 162.
broad-tailed, 163.
calliope, 163.
rufous, 163.
Xylocichla fuscescens salicicola, 195.
guttata auduboni, 196.
ustulata swainsoni, 196.

I.

Icteridæ, 169.
Indian paint brush, 19, 21, 22.
Insectivora, 97.
Iridoprocne bicolor, 180.
Ixoreus nævius meruloides, 197.

J.

Jack rabbit, prairie, 78.
Jacob's-ladder, 22.
blue, 23.
Jay, black-headed, 165.
Rocky Mountain, 166.
Jumping mouse, 69.
Junco, Montana, 177.
Junco oreganus montanus, 177.
Juniper, creeping, 19.
mountain, 20.
shrubby, 21.

K.

Kalmia glauca, 22.
Killdeer, 134.
Kingbird, 164.
Kingfisher, belted, 157.
Kinglet, golden-crowned, 194.
ruby-crowned, 194.

L.

Lagomorpha, 75.
Lagopus leucurus altipetens, 139.
Laniidæ, 183.
Lanius ludovicianus excubitorides, 183
Laridæ, 114.
Larix lyelli, 22.
occidentalis, 94.
Lark, desert horned, 165.
Larkspur, 19, 21, 22.
Larus californicus, 114.
delawarensis, 114.
philadelphia, 114.
Lasionycteris noctivagans, 101.
Lazuli bunting, 180.
Lemming mouse, mountain, 50.
Leporidæ, 77.
Lepus bairdi bairdi, 77.
townsendi campanius, 78.
Lesser scaup duck, 121.
Leucosticte, gray-crowned, 173.
Leucosticte tephrocotis tephrocotis, 173.
Lewis woodpecker, 161.
Life zones, 18.
Limicolæ, 132.
Lincoln sparrow, 178.
Little chief hare, 75.
Little mountain chipmunk, 42.
Lobipes lobatus, 132.
Loco, 19.
Lodgepole pine, 20.
Longipennes, 114.
Long-legged bat, 100.
Longspur, Alaska, 175.
chestnut-collared, 175.
McCown, 176.
Long-tailed chickadee, 193.
Loon, 113.
Lophodytes cucullatus, 116.
Lousewort, 22.
Loxia curvirostra bendirei, 173.
leucoptera, 173.
Lumber jack, 166.
Lutra canadensis canadensis, 85.
Lutreola vison energumenos, 86.
Lynx, bay, 82.
Canada, 81.
canadensis, 81.
uinta, 82.

M.

McCown longspur, 176.
MacFarlane screech owl, 156.
Macgillivray warbler, 186.
Macrochires, 161.
Magpie, 165.
Mallard, 117.
Mantled ground squirrel, 43.
Maple, mountain, 20.
Mareca americana, 118.

Digitized by Google

Marila affinis, 121.
americana, 121.
collaris, 122.
marila, 121.
valisineria, 121.
Marmota caligata nivaria, 50.
monax petrensis, 53.
Marsh hawk, 146.
Marten, 88.
Martes americana caurina, 88.
Martes pennanti, 90.
Masked shrew, 100.
Meadowlark, western, 170.
Meadow rue, 56.
Melanerpes erythrocephalus, 160.
Melospiza lincolni lincolni, 178.
melodia fallax, 178.
Menziesia, rusty, 21.
smooth, 21.
Mephitis hudsonica, 91.
Merganser, 115.
hooded, 116.
red-breasted, 116.
Mergus americanus, 115.
serrator, 116.
Micropodidæ, 162.
Microtus drummondi, 63.
mordax mordax, 62.
richardsoni macropus, 61.
Milk vetch, 22.
Mimidæ, 190.
Mimulus, rose-red, 21.
Mink, 86.
Mniotilta varia, 183.
Mniotiltidæ, 183.
Mockingbird, 190.
Molothrus ater artemisiæ, 169.
Montana junco, 177.
Moosebird, 166.
Motacillidæ, 187.
Mountain ash, 21, 56, 95.
bluebird, 198.
chickadee, 193.
goat, 28.
gooseberry, 22.
lion, 79.
pink, 23.
red fox, 84.
sheep, 26.
song sparrow, 177.
sorrel, 30.
Mouse, jumping, 69.
meadow, Drummond, 63.
large-footed, 61.
Rocky Mountain, 62.
Mouse—Continued.
mountain lemming, 59.
red-backed, 60.
white-footed, 58.
woods, 58.
Mule deer, 33.
Muridæ, 53.
Muskrat, 63.
Mustela arizonensis, 87.
cicognanii cicognanii, 88.
longicauda longicauda, 87.
Mustelidæ, 85.
Myadestes townsendi, 195.
Myiochanes richardsoni richardsoni, 164.
Myotis lucifugus longicrus, 100.

N.

Nannus hiemalis pacificus, 191.
Neosorex navigator navigator, 97.
Neotoma cinerea cinerea, 53.
Nettion carolinense, 118.
Nighthawk, Pacific, 161.
Northern phalarope, 132.
pileated woodpecker, 159.
varied thrush, 197.
violet-green swallow, 181.
Nucifraga columbiana, 167.
Numenius americanus occidentalis, 134.
Nutcracker, Clark, 167.
Nuthatch, red-breasted, 193.
Rocky Mountain, 192.
Nuttallornis borealis, 164.
Nyctea nyctea, 156.
Nycteris cinerea, 101.

O.

Ocean spray, 20.
Ochotona princeps, 75.
Ochotonidæ, 75.
Odocoileus hemionus hemionus, 33.
virginianus macrourus, 35.
Odontophoridæ, 135.
Oidemia deglandi deglandi, 127.
Olive-backed thrush, 196.
Olive-sided flycatcher, 164.
Olor buccinator, 129.
columbianus, 129.
Oporornis tolmiei, 186.
Orange-crowned warbler, 183.
Oreamnos montanus missoulæ, 28.
Osprey, 150.
Otocoris alpestris leucolæma, 165.

Digitized by Google

Otter, 85.
Otus asio macfarlanei, 156.
Ouzel, water, 188.
Ovis canadensis canadensis, 26.
Owl, Arctic horned, 156.
great gray, 154.
hawk, 156.
MacFarlane screech, 156.
Richardson, 154.
Rocky Mountain pygmy, 157.
saw-whet, 155.
short-eared, 154.
snowy, 156.
western horned, 156.
Oxyechus vociferus vociferus, 134.
Oxyria digyna, 30.

P.

Pachystima myrsinites, 21.
Pacific nighthawk, 161.
Pack rat, 53.
Paludicolæ, 131.
Pandion haliaëtus carolinensis, 150.
Pandionidæ, 150.
Panther, 79.
Paridæ, 193.
Passerculus sandwichensis alaudinus, 176.
Passerella iliaca schistacea, 178.
Passeres, 164.
Passerina amœna, 180.
Pectoral sandpiper, 133.
Pediœcetes phasianellus columbianus, 145.
Pelecanidæ, 115.
Pelecanus erythrorhynchos, 115.
Pelican, white, 115.
Penthestes atricapillus septentrionalis, 193.
gambeli gambeli, 193.
rufescens rufescens, 194.
Pentstemon, 22.
blue, 21.
purple, 21.
Perisoreus canadensis capitalis, 166.
Peromyscus maniculatus artemisiae, 58.
osgoodi, 58.
Petrochelidon albifrons albifrons, 180.
Pewee, western wood, 164.
Phacelia, 22, 30.
Phalacrocoracidæ, 115.
Phalacrocorax auritus auritus, 115.
Phalarope, northern, 132.
Phalaropodidæ, 132.
Phenacomys orophilus, 59.
Phlœotomus pileatus picinus, 159.
Phyllodoce empetriformis, 22.
Phyllodoce glanduliflora, 22.
Physiography, 15.
Pica pica hudsonia, 165.
Pici, 158.
Picidæ, 158.
Picoides americanus fasciatus, 158.
arcticus, 158.
Pigeon, 145.
hawk, 149.
Pika, 75.
Pileolated warbler, 186.
Pine lily, 21.
siskin, 174.
squirrel, 37.
Pinicola enucleator montana, 171.
Pink snow, 17.
Pintail, 120.
Pinus albicaulis, 22.
Pipilo maculatus arcticus, 179.
Pipit, 187.
Piranga ludoviciana, 180.
Pisobia maculata, 133.
Planesticus migratorius propinquus, 196.
Plectrophenax nivalis nivalis, 175.
Plover, black-bellied, 134.
upland, 133.
Pocket gopher, brown, 73.
Saskatchewan, 71.
Polemonium viscosum, 22.
Pœcetes gramineus confinis, 176.
Porcupine, yellow-haired, 96.
Porzana carolina, 131.
Prairie falcon, 149.
Ptarmigan, southern white-tailed, 139.
Pulsatilla occidentalis, 22.
Puccoon, 19.
Puma, 79.
Pygopodes, 110.

Q.

Querquedula cyanoptera, 119.
discors, 119.

R.

Rabbit, prairie jack, 78.
snowshoe, 77.
Rail, sora, 131.
Rallidæ, 131.

Digitized by Google

Raptores, 145.
Raspberries, 95.
Raven, 167.
Recurvirostra americana, 132.
Recurvirostridæ, 132.
Red-backed mouse, 60.
Red-breasted merganser, 116.
nuthatch, 192.
Redhead, 121.
Red-headed woodpecker, 160.
Red-naped sapsucker, 159.
Redpoll, 174.
Red-shafted flicker, 161.
Redstart, 187.
Red-tail, western, 147.
Redwing, thick-billed, 169.
Regulus satrapa olivaceus, 194.
Rhynchodon peregrinus anatum, 149.
Rhyncophanes mccowni, 176.
Richardson ground squirrel, 49.
grouse, 135.
owl, 154.
pine squirrel, 37.
Ring-billed gull, 114.
Ring-necked duck, 122.
Riparia riparia riparia, 181.
Robin, western, 196.
Rock wren, 191.
Rocky Mountain creeper, 192.
hairy woodpecker, 158.
jay, 166.
laurel, 22.
meadow mouse, 62.
nuthatch, 192.
pine grosbeak, 171.
pygmy owl, 157.
Rodentia, 37.
Rose, prairie, 19.
Ross goose, 127.
Ruby-crowned kinglet, 194.
Ruddy duck, 127.
Ruffed grouse, gray, 137.
Rufous hummingbird, 163.

S.

Sagebrush cowbird, 169.
Salpinctes obsoletus obsoletus, 191.
Sandhill crane, 131.
Sandpiper, pectoral, 133.
spotted, 133.
western solitary, 133.
Sapsucker, red-naped, 159.
Williamson, 159.
Saw-whet owl, 155.
Saxifrage, 22, 23.
Scaup duck, 121.
Sciuridæ, 37.
Sciurus hudsonicus richardsoni, 37.
Scolopacidæ, 132.
Scoter, white-winged, 127.
Scotiaptex nebulosa nebulosa, 154.
Seiurus noveboracensis notabilis, 184.
Selasphorus platycercus, 163.
rufus, 163.
Senecio, 22.
Service berry, 19, 20, 95.
Setophaga ruticilla, 187.
Sharp-shinned hawk, 146.
Shooting star, 23.
Short-eared owl, 154.
Shoveler, 119.
Shrew, Dobson, 99.
dusky, 98.
masked, 100.
water, 97.
Shrike, white-rumped, 183.
Sialia currucoides, 198.
Sibbaldia, 23.
Silene acaulis, 23, 140.
Silver-haired bat, 101.
Silver-leaf, 19.
Siskin, pine, 174.
Sitta canadensis, 193.
carolinensis nelsoni, 192.
Sittidæ, 192.
Skunk, northern, 91.
Slate-colored fox sparrow, 178.
Snipe, Wilson, 132.
Snowberry, western, 19.
Snow bunting, 175.
Snow goose, 127.
Snowshoe rabbit, 77.
Solitaire, Townsend, 195.
Sora rail, 131.
Sorex obscurus obscurus, 98.
personatus, 100.
vagrans dobsoni, 99.
Soricidæ, 97.
Sorrel, mountain, 130.
Southern white-tailed ptarmigan, 139.
Sparrow, Gambel, 171.
lark, 176.
Lincoln, 178.
mountain song, 178.
slate-colored fox, 178.
tree, 177.
vesper, 176.

Digitized by Google

Sparrow—Continued.
western chipping, 177.
western Savannah, 176.
white-crowned, 177.
Spatula clypeata, 119.
Sphyrapicus thyroideus nataliæ, 159.
varius nuchalis, 159.
Spinus pinus pinus, 174.
Spiræa, 55.
Spizella monticola ochracea, 177.
passerina arizonæ, 177.
Spotted sandpiper, 133.
Spring beauty, 23.
Spruce, Canada, 21.
Squatarola squatarola, 134.
Squaw grass, 21.
Squirrel hawk, 147.
Squirrel, Richardson pine, 37.
Steganopodes, 115.
Stellaria, 22.
Stellula calliope, 163.
Sterna forsteri, 114.
Streptoceryle alcyon alcyon, 157.
Streptopus, 137.
Striped ground squirrel, 59.
Sturnella neglecta neglecta, 170.
Subalpine fir, 20, 22.
Surnia ulula caparoch, 156.
Swallow, bank, 181.
barn, 180.
cliff, 180.
northern violet-green, 181.
tree, 180.
Swan, trumpeter, 129.
whistling, 129.
Swift (fox), 85.
Vaux, 162.
white-throated, 162.
Sylviidæ, 194.
Syringa, 20.

T.

Tachycineta thalassina [illegible]
Tamarack, dwarf mountain, [illegible]
western, 21, 94.
Tanager, western, 180.
Tangaridæ, 180.
Taxidea taxus, 91.
Teal, blue-winged, 119.
cinnamon, 119.
green-winged, 118.
Tern, Forster, 114.
Tetraonidæ, 135.
Thick-billed redwing, 189.
Thimbleberry, 21, 55, [illegible]
Thistle, mountain, 94.
Thomomys fuscus fuscus, 71
talpoides talpoides, 71
Thornapple, black, 20
Thrush, Audubon's [illegible]
northern varied, [illegible]
olive-backed, [illegible]
willow, 186
Tiarella, 21
Tinnunculus [illegible]
189
Titmouse, [illegible]
Toad, 18
Townsend's [illegible]
Towhee, Arctic [illegible]
Townsend's [illegible]
Trade [illegible]
Tr[illegible]
Trans[illegible] Z[illegible]
Tree [illegible]
Tro[illegible]
Tr[illegible]
Tr[illegible]
T[illegible]
T[illegible]
T[illegible]

V

W[illegible]
W[illegible]

Digitized by Google

Warbler, Audubon, 183.
black and white, 183.
Macgillivray, 186.
orange-crowned, 183.
pileolated, 186.
Townsend, 184.
western yellow-throat, 186.
yellow, 183.
Water leaf, 22.
Water shrew, 97.
Water ouzel, 188.
Water-thrush, Grinnell, 184.
Waxwing, Bohemian, 182.
cedar, 182.
Weasel, Arizona, 87.
Bonaparte, 88.
long-tailed, 87.
Western birch, 19.
chipping sparrow, 171.
crow, 167.
evening grosbeak, 171.
flycatcher, 164.
golden-crowned kinglet, 194.
goshawk, 147.
grebe, 110.
harlequin duck, 124.
horned owl, 156.
house wren, 191.
lark sparrow, 176.
mourning dove, 145.
redtail, 147.
robin, 196.
solitary sandpiper, 133.
tanager, 180.
tree sparrow, 177.
vesper sparrow, 176.
warbling vireo, 183.
white-tail deer, 35.
winter wren, 191.
wood pewee, 164.
yellow-throat, 186.
White-barked pine, 22.
White-crowned sparrow, 177.
White-footed mouse, forest, 58.
White goat, 28.
pelican, 115.
White-rumped shrike, 185.
White-tail deer, 35.
White-throated swift, 162.
White-winged crossbill, 162.
scoter, 127.
Wild cat, 82.
Willow, 21.
dwarf, 23, 143.
thrush, 195.
Williamson sapsucker, 159.
Wilson snipe, 132.
Wilsonia pusilla pileolata, 186.
Wind flower, 22.
purple, 19.
Woodchuck, brown, 53.
Woodpecker, Alaska three-toed, 158.
Arctic three-toed, 158.
Batchelder, 158.
Lewis, 161.
northern pileated, 157.
red-headed, 160.
Rocky Mountain hairy, 158.
Woodrat, gray bushy-tailed, 53.
Wolf, gray, 82.
Woods mouse, 58.
Wolverine, 90.
Wren, rock, 191.
western house, 191.
western winter, 191.

X.

Xerophyllum tenax, 94.

Y.

Yellow-bellied chipmunk, 40.
Yellow-legs, greater, 133.
Yellow pine, 20.
Yellow-throat, western, 186.
Yellow warbler, 183.
Yew, western, 21.

Z.

Zamelodia melanocephala melanocephala, 179.
Zapodidæ, 69.
Zapus princeps princeps, 69.
Zenaidura macroura marginella, 145.
Zone, Arctic-Alpine, 23.
Canadian, 20.
Hudsonian, 22.
Transition, 19.
Zonotrichia gambeli, 177.
leucophrys, 177.

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